FROM THE MOUTHS OF BABES: INFANT MORTALITY AND MEDICALISED MOTHERHOOD IN COUNTY DURHAM, ENGLAND, 1892-1914

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ABSTRACT

At the turn of the twentieth century, County Durham, a coal-mining region in England's Northeast, experienced some of the highest infant mortality rates in the country. At the same time, medical discourse focused on improving infant health outcomes was undergoing a dramatic shift that placed growing importance on the role of the mother and her abilities to raise the next generation of healthy imperial Britons. Within a national context, medical literature published by Medical Officers of Health (MOHs) identified the ignorance of working-class mother as the predominate determinant of poor infant health outcomes across the country. The suggested remedy was found in education reforms. Yet the reports published by MOHs within County Durham did not mirror this sentiment. Within County Durham, mothers were still blamed from high infant death rates, but the rationale behind this blame differed depending on the backgrounds of individual MOHs, and the approaches taken to address infant health concerns were likewise varied across the districts of the county.

This thesis examines the medical discourse surrounding infant health and motherhood between MOHs at the national, regional, and local levels from 1892 to 1914, and argues that infant health initiatives were highly variable during the period. It contributes a vital case study to the growing literature surrounding public health initiatives and infant welfare. This research also demonstrates a regional variability of mother blaming that has not been present in recent historical analyses. Reports issued by MOHs alongside other archival materials allowed for both quantitative and qualitative analyses to be incorporated into this research, which were further supplemented by digital methodologies such as Historical Geographic Information Systems (HGIS). This thesis contributes to current histories of public health and motherhood by examining a predominately working-class region of England that experienced infant health outcomes and medical approaches unseen in other parts of the country.

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Danika Bonham

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LIST OF ABBREVIATIONS

IMR – Infant Mortality Rate (deaths per 1,000 live births)

MOH – Medical Officer of Health

RD – Rural District

UD – Urban District

INTRODUCTION

> The subject on which to address you to-night has been for me one of anxious consideration, but in choosing that of Infant Mortality I feel that I am dealing with one which is equally of interest to the medical practitioner and to the Medical Officer of Health, and, moreover, is becoming of vital importance to the future welfare of the nation.[1]

On Friday, the 24th February, 1905, T. Eustace Hill gave his inaugural address as the President of Northern Branch of the Incorporated Society of Medical Officers of Health, choosing to focus his attention on the high infant mortality rates (IMRs) experienced not only across Britain, but within his own region of County Durham.[2] As County Medical Officer of Health (MOH) for County Durham during the late-nineteenth and early-twentieth centuries, Hill oversaw some of the highest IMRs recorded in England during the period. By 1910, County Durham was officially singled out as one of the "extreme" counties that exhibited some of the highest IMRs compared to the rest of the country.[3] In a period where IMRs were in decline across the country, County Durham lagged behind other counties that were successfully combating high IMRs.

The conceptualisation of infant health and methods of improving the survival rates of the high-risk infant population were influenced by numerous factors during the turn of the twentieth century. Scientific knowledge in the realm of bacteriology brought to light within the medical community a better—although not entirely accurate—understanding of diarrhoea; a disease that posed one of the greatest risks to infant life. Infantile diarrhoea was linked to methods of feeding, and as such, attention shifted from external dangers of the outside environment under the influence of the medical officer, to the dangers present within the home that threatened the lives of infants. MOHs became keen to influence the maternal practices of the working class as a means of improving IMRs. The methods employed and promoted by MOHs were themselves influenced by the social milieu of the turn of the century; MOHs increased their focus on motherhood during a period of intense debate surrounding the role of women within British society.

This thesis examines how the discourse surrounding infant mortality and motherhood was shaped and framed through a medical lens within national, regional, and local contexts. It

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[1] T. Eustace Hill, "Infant Mortality," *Public Health* 17, no. 10 (July 1906): 623.

[2] IMRs represent the number of infant (under one year old) deaths per 1,000 live births.

[3] County Durham recorded the highest IMRs in England for the year, and was the second worst county in England and Wales. See: Local Government Board and Arthur Newsholme, *Thirty-Ninth Annual Report of Local Government Board, 1909-10. Supplement to the Report of the Board's Medical Officer Containing a Report by the Medical Officer on Infant and Child Mortality,* (1910), 8–9, from the Wellcome Library. https://wellcomelibrary.org/item/b2136168x.

demonstrates that at these three authoritative levels, different approaches were discussed, encouraged, and acted upon as a means of reducing high IMRs by focusing on the mothering techniques of working-class women. Significantly, this comparative level of analysis provides nuance to the dynamic local approaches to reduce IMRs within County Durham during the late-nineteenth and early-twentieth centuries, demonstrating that local MOHs in County Durham did not adopt the same outlooks or approaches to improving IMRs as those that were championed within other regional and national medical discourses. The consistent blame placed on mothers which centred on ignorance and neglect were key factors in high IMRs present at the national and regional levels, but this blame was not mirrored in the individual reports of local MOHs in County Durham. Mothers were still singled out as the major factor for high IMRs whenever they were discussed, but the reasoning behind this blame differed and was shaped by the biases and backgrounds of individual MOHs within County Durham throughout the turn of the century. This suggests a regional dimension to mother blaming.

The historiography surrounding infant mortality and its links to public health initiatives and motherhood intersects with a dynamic and complex field of study that incorporates social, gender, and digital history methodologies and approaches. The early studies of public health were revisionist critiques to the works of Thomas McKeown in the 1980s, whereas later studies of motherhood resulted in the emergence of social and gender histories, influenced by the works of Anna Davin and Deborah Dwork.[4] By revaluating the McKeown's work, historians of public health began focusing on micro-histories that incorporated a broader array of sources to better demonstrate the variance of health approaches across Britain. These local studies were further expanded with the increased usage of digital methodologies in the 1990s, and were incorporated by historians of motherhood examining infant health.

The McKeown thesis emerged from various works conducted by physician and epidemiologist Thomas McKeown and was published in *The Modern Rise of Population* in 1976.[5] McKeown argued that Registrar-General death records and reports indicated that the mortality decline experienced by Britain during the nineteenth century was not a result of scientific initiatives such as vaccinations, but rather an interplay of primary and secondary factors during the same

[4] Thomas McKeown, *The Modern Rise of Population,* (London: Edward Arnold, 1976); Anna Davin, "Imperialism and Motherhood." *History Workshop*, no. 5 (1978): 9–65; Deborah Dwork. *War is Good for Babies and Other Young Children: A History of the Infant and Child Welfare Movement in England 1898-1918.* (London; New York: Tavistock Publications, 1987).

[5] McKeown, *The Modern Rise of Population.*

period. The primary change that resulted in improved health outcomes across Britain, McKeown claimed, was improved access to nutritious foods, as a result of improved standards of living, whereas the secondary changes were a combination of sanitary reforms and naturally reduced disease virility. The primary claim from the McKeown thesis sparked public health historians in the 1980s to aggressively counter McKeown's claims with new archival evidence and localised case studies that found flaws in McKeown's long dureé assessment of national health. Simon Szreter was one of the earliest critics of the McKeown thesis. Szreter focused on discrediting the primary factor of improved access to nutritious foods, with one of his earliest pieces against the thesis calling for increased localised studies of public health initiatives.

Szreter indicates that McKeown had misread the Registrar-General data used and also assumed steady and upwards economic trajectories during the nineteenth century.[6] Furthermore, McKeown failed to recognise the significant political and philosophical contexts of the nineteenth century that gave rise to the public health movement.[7] As a result, McKeown presented a thesis that did not efficiently reflect the dynamic origins of the public health movement in the nineteenth century, nor did his thesis appropriately engage with historical data. Szreter argues, instead, that McKeown was more influenced by contemporary politics that were skeptical of the welfare-state and socialised medical systems.[8] Therefore, Szreter claimed McKeown's work to be biased and inaccurate when critically analysed.

Anne Hardy was another of McKeown's critics who countered his primary claim using the same Registrar-General data supplemented with municipal reports and other local records. Hardy's *The Epidemic Streets* focuses on eight of the major diseases discussed by McKeown, but demonstrates that MOHs in London significantly reduced the severity of disease outbreaks and actively sought methods of reducing disease outbreaks through quarantine, improved sanitation, and disinfectant programs.[9] However, while these works by Szreter, Hardy and other historians of public health were focused on disproving McKeown's central claim, they did little to discredit the secondary causes listed by McKeown. Mortality decline in Britain, as indicated by McKeown, was also caused by improved sanitation measures, and the reduction of disease severity due to

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[6] Simon Szreter, "The Importance of Social Intervention in Britain's Mortality Decline c.1850–1914: A Re-Interpretation of the Role of Public Health." *Social History of Medicine* 1, no. 1 (1988): 18.

[7] Simon Szreter, "The McKeown Thesis: Rethinking McKeown: The Relationship between Public Health and Social Change," *American Journal of Public Health* 92, no. 5 (May 2002): 722.

[8] Ibid., 723.

[9] Ann Hardy, *The Epidemic Streets: Infectious Diseases and the Rise of Preventive Medicine 1856–1900* (Oxford: Oxford University Press, 1993), 292.

inherited resistance and viral mutations. McKeown's fiercest critics focused their attention on the primary cause of nutrition, while failing to mention improved sanitation, despite sanitation improvements being one of the major preventative factors implemented by MOHs across Britain during the nineteenth and twentieth centuries.[10] This oversight may reflect the way that medical historians prioritised disease over sanitation.

Bill Luckin is an early environmental historian who was critical of the McKeown thesis in the 1980s, but was not as aggressive as other historians of public health. Luckin pointed out the spatial variances not referenced by the broad assertions by McKeown, particularly how areas in England's Northeast (of which County Durham is a part of) failed to follow mortality trends exhibited in other parts of the country during the turn of the century.[11] Further studies by Luckin indicated that sanitation did play an important role in the reductions of disease outbreaks, particularly typhus, but failed to show any evidence for improved nutrition reducing disease mortality.[12] Luckin recognised that much of the criticism leveled at McKeown was based on the rebuttals formed against the claim that nutrition was key in decreased mortality rates, with little recognition given to the secondary factors focused on sanitation outlined by McKeown. Sanitary reforms brought about in part by the individual efforts of MOHs were a significant factor in reducing disease outbreaks, and therefore lowered overall mortality rates. While some critics of McKeown, including Luckin, acknowledged that the secondary factors outlined by McKeown contributed to declining morality rates in Britain throughout the nineteenth century, other critics like Hardy and Szreter dismissed the thesis as a whole due to McKeown placing primary importance on improved access to nutritious foods over sanitary reforms.

Building on the early work of Szreter, Hardy, Luckin, and other historians of public health, studies in the 1990s increasingly used IMRs to determine the overall health of populations and the successful (or unsuccessful) ventures of local MOHs. These studies also used sanitation as an important indicator of health outcomes, yet paid little references to McKeown's secondary claims.

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[10] Typhus was the only disease Hardy explicitly mentioned that was reduced by improved standards of living, yet she did not indicate that the McKeown thesis held some ground in this example. Hardy linked outbreaks of typhus with periods of economic depression, and noted bread riots all occurred in the same years that there were typhus outbreaks. It was during these years that working-class families were required to share single-family accommodations with one or more other families, rendering it near impossible to maintain a sanitary living environment for these families. Hardy, 205.

[11] Bill Luckin, *Death and Survival in Urban Britain: Disease, Pollution and Environment, 1800-1960* (London: Tauris, 2015), 7.

[12] Ibid., 48.

Further setting these studies apart from earlier public health studies was the use of large datasets and digital methodologies that explored the demographics of infant health. The "Mortality in the Metropolis" project founded by the Centre for Metropolitan History (centred in London) established an early database of mortality rates within London that later expanded to other parts of the country. Significantly, the works coming out the "Mortality" project indicated a direct link between local environments and infant health outcomes. From these data, Graham Mooney developed the "sanitary test" which was instrumental in linking temperature and poor sanitation to higher instances of infant mortality in London. Mooney demonstrated that warm summers exacerbated rates of infantile diarrhoea, and in unsanitary areas of London these higher diarrhoea rates often correlated with higher incident rates of infant mortality. The areas with the poorest sanitation measures and highest IMRs during warm summers were also, unsurprisingly, home to the working and poorer classes.[13]

The scholarly push for comparative micro-histories of public health continued in a second publication from the "Metropolis" project, written by Mooney and Naomi Williams. In this study Mooney and Williams compared IMRs among London districts and 21 English cities, and found that little attention had been paid to the different strategies employed by municipal governments. Rather than focusing on a single town or city, Mooney and Williams studied the decline of overall IMRs in the twentieth century by examining the individual measures taken by municipal health officials within the context of a broader trend of health initiatives, and socioeconomic changes.[14] Because these towns were often in communication with one another, Mooney and Williams recognised that a comparative framework was the only efficient way to determine if the individual approaches used by local governments to reduce infant mortality were truly unique to the region, or if they were similar to the approaches adopted by surrounding communities.[15]

Infant mortality and public health initiatives among the working class have also been investigated by gender historians, as mothers were often blamed by MOHs for higher infant death rates. Historians of motherhood have included and worked with the data collected by projects such as the "Metropolis" project and other digital databases to conduct local studies into infant mortality and the medicalization of motherhood. Alice Reid's work on working-class mothers in Derbyshire

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[13] Graham Mooney, "Did London Pass the 'Sanitary Test'? Seasonal Infant Mortality in London, 1870-1914," *Journal of Historical Geography* 20, no. 2 (1994): 164.

[14] Naomi Williams and Graham Mooney, "Infant Mortality in an 'Age of Great Cities': London and the English Provincial Cities Compared, c. 1840-1910," *Continuity and Changes* 9, no. 2 (1994): 186.

[15] Williams and Mooney, 208.

includes the use of statistical data, but also incorporates gender analysis frameworks established by earlier historians of motherhood such as Deborah Dwork and Anna Davin.[16] In the 1970s and 80s Davin and Dwork examined how anxieties surrounding the decline of British imperial power fed into increased maternalistic sentiments within British society.[17] Prominent MOHs such as Arthur Newsholme and George Newman, claimed that high IMRs were allegedly the fault of unfit, negligent, and ignorant mothers, and as such MOHs across the country set about finding ways to remedy the ignorance of current mothers while preparing the next generation of mothers for their maternal duties.

Gender studies centred on British motherhood during the late-nineteenth and early-twentieth centuries have also examined the discourse focused on infant feeding and showed how the preoccupation with working-class mothers was influenced by imperial anxieties. While there was a body of medical and scientific support indicating that breastfed infants were healthier than their bottle-fed counterparts, there was little discussion of the difficulties faced by working-class women in their attempts to breastfeed. MOHs attributed a lack of breastfeeding among working-class mothers to laziness, ignorance, or neglect of maternal duties, rather than a result of socioeconomic conditions that burdened working-class mothers with poor nutrition and overexertion, which in some instances made bottle feeding with milk substitutes the more viable option. Dwork, Davin, and more recent studies on British motherhood claim that the arguments in favour of breastfeeding were socially constructed according to middle-class moral sensibilities which stemmed from the perceived need to improve health outcomes for the next generation of working-class Britons. Improving the health of the working class, it was argued, would mend Britain's damaged imperial authority, especially following the events of the first Boer War.[18]

The demographics of infant mortality linked association with medicalised motherhood has been studied by Alice Reid, who provides a point of convergence for the gender and public health

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[16] Alice Reid, "Health visitors and child health: did health visitors have an impact?" *Annales de démographie historique* 101, no. 1 (2001): 117; Alice Reid, "Health Visitors and 'Enlightened Motherhood'," in *Infant Mortality: A Continuing Social Problem*, ed. Eilidh Garrett, Chris Galley, Shelton, Nicola, and Robert Woods, (Aldershot, England: Ashgate Publishing, Ltd., 2006); Alice Reid, "Infant Feeding and Child Health and Survival in Derbyshire in the Early Twentieth Century," *Women's Studies International Forum* 60 (January 2017): 111–19.

[17] Davin, Dwork.

[18] Davin and Dwork both discuss this and more recently the social aspects of infant feeding have been explored in: Glenda Wall, "Moral Constructions of Motherhood in Breastfeeding Discourse." *Gender & Society* 15, no. 4 (2001): 592–610; Joan B Wolf, *Is Breast Best? Taking on the Breastfeeding Experts and the New High Stakes of Motherhood*. (New York: New York University Press, 2011); and Francesca Moore, "Governmentality and the Maternal Body: Infant Mortality in Early Twentieth-Century Lancashire." *Journal of Historical Geography* 39 (January 2013): 54–68.

analyses in this historiography.[19] Like historians of public health, Reid calls for more localised case studies examining how infant health was approached by local MOHs within given regions while building on the work of historians of motherhood. Likewise, this thesis builds on foundations and frameworks set by these historians of motherhood and historians of public health. In doing so, it incorporates a comparative scale of analysis that examines infant mortality and motherhood through a medical lens dictated by the publications of MOHs across the country and within County Durham. Furthermore, this thesis utilises the digital methodologies employed by historians of public health including spatial analyses using HGIS and the creation of a sanitary test.[20]

This thesis contributes to the work of historians of motherhood and public health by building on the methodologies and historical contexts provided by historians of public health and motherhood. This project makes two major contributions of original research on a county previously missing from the record, despite its abysmal IMRs throughout the late-nineteenth and early-twentieth centuries. The first contribution to the historiography comes from the scale of analysis present in this thesis. By examining infant mortality through a medical lens provided by MOHs at the national, regional, and local level, the nuanced and varied approaches taken by MOHs to improve infant health within their localised setting is made more apparent, and is presented in contrast to the more uniform and singular approaches encouraged by regional and national MOH publications. The second contribution is in the examination of motherhood, specifically focusing on the blame MOHs placed on mothers with regard to high IMRs. In national and regional discussion, high IMRs were attributed to ignorance and neglect, whereas more local MOHs blamed mothers for a wider variety of maternal failings. Focusing on a county level analysis demonstrates how national medical discourses permeated some levels of local medical practices, but much of the on-the-ground work by district MOHs was dictated in part by the personal convictions of the MOH and the resources available to local councils.

The period 1892-1914 was selected for this study based on the availability of relevant MOH publications alongside the eventual emergence of nationalised approaches to infant and maternal welfare. The county MOH reports for County Durham, issued by Hill, were available beginning in 1892 and corresponded with a period that saw not only increased attention given to

[19] Reid, "Health visitors and child health: did health visitors have an impact?"; Reid, "Health Visitors and 'Enlightened Motherhood',"; Reid, "Infant Feeding and Child Health and Survival in Derbyshire in the Early Twentieth Century."

[20] The sanitary test created for this project compared the average IMRs from 1905-1910 with the IMR of 1911 among local districts in County Durham. See Appendix D.

high IMRs, but high and at times rising IMRs in County Durham and across the country. The local MOH reports were also available from a similar period, although the collections of these sources were less consistent than the yearly reports provided by Hill. The outbreak of the First World War was selected as a cut-off point as many of the MOH reports were more focused on wartime necessities, and the First World War also saw the emergence of a national strategy for improving infant and maternal health.[21]

Between 1892-1914, MOHs across the country published in a variety of sources on infant mortality and the associated causes and remedies. First published in 1888, *Public Health: The Journal of the Society of Medical Officers of Health* was intended to be a bridge for MOHs across the country, providing articles on public health initiatives, recent findings in the new science of bacteriology, descriptions of medical cases, and the findings of various sanitary officers across the country. Yet it was not until 1893 that the first article directly addressing IMRs was printed. *Public Health*'s topics were wide reaching, but all were of vital importance to the work of the MOH. While including information on the most up to date research and topics in all matters relating to public health, the journal also included summaries of branch meetings held by the smaller factions of the Society of Medical Officers of Health, allowing for rural MOHs to remain up to date with the workings of their individual branches and the society as a whole. The journal was a vital network for MOHs to share recent trends in public health with their counterparts across the country and also as a means to connect MOHs with the most recent public health information.[22]

Outside of the national and international scope of *Public Health*, MOHs issued annual reports that summarised the overall health of their regions and local districts.[23] Hill's annual reports included summaries of the annual reports issued by the district MOHs within County Durham into a single report. The county report issued by Hill included summaries of each report provided to him alongside commentary for Hill regarding the effective measures being taken up within the county and areas of public health that required further attention from MOHs and local councils.

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[21] For example, The Milk (Mothers and Children) Order (1918) was a national program that ensured expecting mothers and children received rations of milk to improve wartime health. While this order was ended at the conclusion of the war, it along with other national strategies were the foundations for a more nationalised approach to infant and maternal health during the interwar period.

[22] Bound collections of the journal were made available through the Wellcome Library. Online and digital versions exist, but Wellcome did not provide permissions for these versions, nor did the University of Saskatchewan Library have access to these collections.

[23] Districts were the boundaries that local MOHs worked in, and were formed from Sanitary Districts which were in turn based on traditional parish boundaries. District boundaries changed over time, with districts being created or absorbed into neighbouring districts as demographics shifted.

These reports provided an interesting point of comparison when working between the national level conversations found in *Public Health* and the more local conversations exhibited in the local MOH reports used for this project. The annual reports Hill included in his annual summaries were issued by the individual MOHs to their local councils as a means to report on the public health measures that were either in effect, or measures the MOH believed their council should adopt. In these reports, the day to day functions of local MOHs in County Durham were more apparent than in the summaries issued by Hill, or the articles issued in *Public Health*.[24] These sources provide the archival body for this research that was then supplemented with the historical contexts provided in the secondary literature alongside and spatial analysis using HGIS and other digital methodologies.

Digital mapping technologies that enabled the IMRs of the districts across County Durham to be spatially analysed allowed for a more cohesive approach to examining how IMRs related to space and place over time. Prior to archival work I created investigatory maps with data available through *A Vision of Britain Through Time*, the online portal for data collected by the *GB GIS* and *Mortality in the Metropolis* projects discussed earlier. These early maps were limiting, in that unlike data collected for London during the *Metropolis* project, birth and death records were only available at the registration district level and were only provided during census years prior to 1911. After 1911, the data source changed, and sub-registration districts were included in *Vision*'s database and map boundary files. The change in mapping units was vital, as district MOHs were assigned to these sub-registration districts, and data gathered from the archival materials was used to reverse-engineer IMR maps in County Durham from 1892 through to 1910. Furthermore, the maps provided valuable insight into socioeconomic trends that provided a unique opportunity for the use of digital data retrieval methods.

The creation of these pre-archive maps was assisted with the use of a python script that enabled the birth and death statistics provided in the HTML code of *Vision* to be scraped and quickly complied in an excel spreadsheet (for the python script used see Appendix A). These data were then connected with the boundary files provided by *Vision* and used to spatially represent

[24] The main collection of these sources is housed at the Wellcome Library in their closed stacks. However, due to recent digitization initiatives, none of the district MOH reports were available for use during my time in the archives in the summer of 2017. As such, the only way these sources were available were when they were released by Wellcome in their digital versions throughout the digitization process. The end of the digitization project for all MOH reports held by Wellcome is scheduled to end in the fall of 2018, resulting in some reports not being made available during the research period of this project.

IMRs at the registration district level for the years 1881, 1891, and 1901, and at the sub-registration district level for the years between 1911 and 1919 (See Appendix B1). These maps indicated increased IMRs in County Durham during the turn of the century, especially in central and coastal districts. Furthermore, these maps indicated that IMRs began to decline only after 1911 due to the missing years from the turn of the century. It was apparent that additional data were required from the archival sources that would allow for IMRs between 1892 and 1910 to be visually represented in the same manner.

Using archival documents as data sources was a time consuming venture and speaks to the value of data repositories such as *Vision*. Creating the initial map set, including the time spent learning ArcGIS and python, was easily half as long as the time spent compiling, calculating, and creating the map data used for the 1892-1919 map set despite a better familiarity with ArcGIS. The use of archived MOH reports also presented additional challenges with data consolidation, as in the County MOH reports only the IMR was recorded, not the birth and death records that were provided by *Vision*. IMR is a useful figure for a quick analysis, but relying on this number alone is problematic depending on the denominators involved. For example, if a smaller district recorded 15 births in one year and only two deaths in infants under one year, it would have an IMR of 133.3. A larger district could have the same IMR of 133.3 if it recorded 150 births and 20 deaths in the same year. Both districts would be represented by the same value on a choropleth map.[25] If the next year the smaller district had two more deaths than the year prior and maintained the same number of births, the IMR would rise to 266.7. Yet if the larger district exhibited the same increase of deaths while maintaining the same number of births, the IMR would only rise to 146.7. This demonstrates one of the inherent difficulties faced with relying on IMR alone, especially when considering areas that have smaller population numbers.

As such, I used the map series created that included IMR data from 1892-1919 as a means of presenting historical questions, rather than a means of answering them (see Appendix B2). The 1892-1919 map series highlighted the regional variations in high IMRs, again echoing the trend of higher IMRs being present in central and coastal districts first noticed in the initial maps. Moreover, the large map series allowed for other environmental factors to be considered and compared to the fluctuations in IMRs visually represented. Warm summers corresponded to

[25] Choropleth maps illustrate demographic changes in colour gradients. For the map series created, IMRs were mapped with the lighter colour indicating districts with lower IMRs and darker colours representative of higher IMRs.

significantly higher IMRs, notably during 1898-1899, and 1911. Temperature data also allowed for a basic sanitary test to be conducted, and for poor performing districts to be identified.[26] Significantly, the cluster of higher IMR districts identified in both map series corresponded to the main economy of County Durham: coal mining.

The Durham Coalfield encompassed a large portion of County Durham, and was part of the larger Great Northern Coalfield. Collieries across County Durham provided work for older boys and working men, and shaped family life in the Northeast that was starkly different from that of the industrial Northwest. The coalfield also had the consequence of shaping the health of the coal mining families in County Durham, with the coalfield and colliery sites overlapping with high IMRs (see Appendix B3). Collieries were important sites as they contained not only the pit entrance to coal mines, but also consisted of any on-sight manufacturing machinery, such as the refining machinery required in coke production. The maps produced including colliery point information in Appendix B3 were created with the assistance of Mike Gill, who has compiled colliery data from across England, and was kind enough to share his data for County Durham. Only a portion of the colliery data was used, however, as Gill data included collieries that were either closed or opened outside of the scope of this project.

Even with the collieries that fell outside of the project scope removed, there remained colliery point information that did not include dates of operation. Some of these points could have been in operation during the period being examined, but they were ultimately removed from the final maps that included colliery points in County Durham (Appendix B4). The available colliery data provides an important point of comparison for IMRs and local socioeconomic conditions within the districts of County Durham, but it is important to note that the collieries presented in this research represent the minimum number of collieries present. It is easily possible that more collieries were operational in the county during the period researched.

The map series created using HGIS indicated not only that there was a correlation between higher summer temperatures and high IMRs, but also that the local environments and unique conditions associated with colliery sites were significant contributors to higher IRMs in County Durham. The questioned remained, however: how did district MOHs react to high IMRs within

[26] The sanitary test used for this study was based on the work by Graham Mooney, and compared the average summer temperatures from the months of July, August, and September to the IMRs of the corresponding year. Temperature data was provided by the Met Office in the UK, and was sourced from a recording station in the City of Durham. Met Office, "Durham," *Climate UK – Historic station data*, accessed January 2017, https://www.metoffice.gov.uk/pub/data/weather/uk/climate/stationdata/durhamdata.txt.

their districts, and how did this relate or compare to the reactions held in other areas of the country or with the popular interpretations of infant health during the period? As such, the journal and reports created by MOHs across the country and in County Durham provided valuable evidence for determining what measures MOHs were taking to counter IMRs in one of the worst performing counties in England and Wales. The following chapters integrate the HGIS data and maps created from the series presented in the appendixes to further supplement the archival materials to show how regional variances in IMRs were linked by local economies and environments.

The first chapter of this thesis examines how a national narrative surrounding IMRs was formed within *Public Health* and how the methods touted in the journal reflected popular attitudes of prominent MOHs and social reformers alike. Social commentators and MOHs both encouraged education reforms for working-class women and young girls, with a focus on educating the next generation of mothers on the proper methods of infant care and management.[27] Significantly, while the journal also included sanitary reform measures and reports on how MOHs had successfully prevented or quickly ended disease outbreaks, the majority of articles discussing infant mortality centred on blaming mothers. The linking of high infant death rates with the caring capabilities of the mothers reflected heavily on many social anxieties of the period that centred on declining imperial influences and significant military losses during the Boer Wars. The articles in *Public Health* during this period focused primarily on improving the mothering capabilities of the next generation through educational reforms. Considerations given to the current generations of mothers were more focused on interventionist methods like home visitors that would provide advice to mothers within their own homes. In both instances, the solution rested with improving the mother, rather than improving her surroundings and accessibility sanitary resources.

The second chapter examines how the county MOH, T. Eustace Hill, summarised infant health initiatives and outcomes within his annual reports. Much like his more prominent counterparts, Hill was quick to blame mothers, despite indicating that socioeconomic conditions in County Durham contributed to higher infant deaths brought about by overcrowding. Likewise, Hill was also a strong supporter of educational reforms, but chose to focus more on the immediate and interventionist approaches available through health visitors. He highlighted the work done by

[27] This push differed greatly from the educational reforms that were argued for middle-class or elite women. It was argued that these upper-class women required better educations in academic studies, and that any training in domestic studies should be discouraged.

women employed in these roles throughout the county and attributed the improved IMRs experienced during the first decade of the twentieth century to the efforts of these women. While Hill did single out MOHs who vocally disagreed with national trends, his reports did not include other approaches taken by MOHs, nor did they mention districts where MOHs were unconcerned with directly addressing IMRs.

The third chapter is a case study on five districts within County Durham, and how the MOHs of each district approached infant health during their time as medical officers. It focuses on the three main coal mining districts of Lanchester UD, Chester-le-Street UD, and Easington UD which were singled out by Hill in a report on infant mortality as areas of high overcrowding resulting in higher IMRs. The other two districts examined in this chapter are districts that were assigned MOHs who held opposing views on the effectiveness of health visitors. The MOH from Sedgefield UD was vocal in his disapproval of the popularity of the health visitor, and was sceptical as to her usefulness in curbing IMRs. This MOH was also the only MOH in County Durham to explicitly mention eugenic ideals, and was highlighted as such in Hill's annual reports. The second MOH came from Spennymoor UD, and was a vocal advocate for the use of health visitors, despite his council never approving the employment of one during period studied. All of these MOHs undertook different approaches to infant health, with some actively seeking methods of improving IMRs, and others choosing to focus on more holistic approaches that would benefit the health of the district more broadly. This case study illustrates that within County Durham there was a lack of consensus guiding the medical and public health initiatives invested in by each local MOH.

Local district MOHs in County Durham did not adopt the same outlook as that presented by their regional and national level counterparts. Rather, infant health initiatives remained highly variable throughout the late-nineteenth century and during the first decade of the twentieth century. While elements of maternalism permeated the medical sensibilities held by MOHs in County Durham, it did not automatically mean that the approaches adopted singled out ignorant working-class mothers or that MOHs immediately adopted national calls for educational reforms or the employment of health visitors. While local MOHs were a part of the knowledge networks created by publications like *Public Health,* their work within their districts was dictated more by their individual conceptualisations of infant health. MOHs also had to prioritise the public health initiatives to better work within the parameters set by their local councils and the resources available to them. Nonetheless, the medical community was influenced by societal anxieties which

vilified elements of working-class motherhood while embracing new practices adopted by the middle class.

CHAPTER 1

Throughout the late-nineteenth and early-twentieth centuries British attitudes shifted on topics of maternity and motherhood, education, the increased medical presence within the home, along with changing scientific and medical knowledge on diarrhoeal disease transmission. The subjects converged to influence infant welfare and discussions on the maternal link to infant health within the journal *Public Health*. First published in 1888, *Public Health*, the journal for the Society of Medical Officers of Health, provided a vital medium of communication between MOHs across the country. The journal established routes of connectivity for MOHs that had not been previously available, and presented many of the more popular approaches to public health issues faced by MOHs to an increasingly welcoming audience. Monthly issues included matters of public health from Continental Europe, the United States, and the British Colonies, intended to inform MOHs in Britain about the broader proceedings of their fellow society members, and the international developments in the field of public health. Issues also included summaries of branch meetings held across the country. Social commentators also submitted articles to *Public Health*, and although not as common as articles submitted by MOHs or physicians, the inclusion of social reformers within the journal demonstrates the dynamic social pressures and influences faced by MOHs during the emergence of the infant health crisis of the late nineteenth century.

The articles and discussions recorded in *Public Health* from its origins in 1888 until the end of the first decade in the twentieth century reveal how social factors influenced the dissemination of medical knowledge among MOHs. This chapter illustrates how changing societal views on infant health, disease pathology, motherhood, preventative and interventionist methods, and education contributed to the infant welfare movement and considers how they were presented in *Public Health*. This chapter builds on the works of Deborah Dwork, and Anna Davin, by arguing for a direct link between growing social anxieties rooted in declining imperial powers, which dictated medical approaches to infant health and medicalised notions of motherhood during the turn of the century.[1] Such associations between imperial strength and new approaches to motherhood were present in the articles submitted and published by *Public Health*. Similarly, the health and educational reforms encouraged by middle-class commentators influenced how MOHs conducted and encouraged new methods of mothering for working-class mothers. These educational reforms have been studied extensively by Carol Dyhouse. She traced social Darwinistic

[1] Davin, Dwork.

approaches to education reforms for mothers. Additionally, Ellen Jordan's study on new middle-class attitudes relating to acceptable education for women further exemplifies shifting attitudes towards motherhood among the middle class. These new sensibilities influenced discussions on how working-class mothers were to be educated, which in turn influenced the proposed remedies to poor mothering featured by MOHs in *Public Health*.[2]

In the first years of its release, *Public Health* mentioned infant health only in passing, and focused on the prevention of specific diseases rather than on a holistic approach to infant health. In these first and few discussions, infant feeding was singled out as one of the most dire vectors of disease communication, with infantile diarrhoea identified as one of the most preventable causes of high IMRs. The pathology of diarrhoea encompassed both the paradigm of miasmic theory and the newly accepted germ theory, resulting in preventive measures that included traditional sanitarian and domestic interventionist approaches. As the understanding of the causes of infantile diarrhoea evolved, and as turn-of-the-century anxieties associated with imperial decline increased, the mother became the focus for contributors to *Public Health* keen to decrease IMRs. As such, increased attention to the economic and domestic lives of mothers were medicalised and critiqued by both medical and social commentators alike.

MOHs regularly encouraged working-class mothers to breastfeed, and when mothers were unable to breastfeed, MOHs often attributed their inability to do so to the actions of a neglectful mothers, rather than the result of poor health or social constraints that might have prevented regular feedings. Continental means of remedying poor food substitutes in the form of milk depots faced strong criticism in *Public Health* due to the associated costs and poor outcomes experienced in British infant welfare centres. Rather, MOHs supported an individualised interventionist model through the use of health visitors in an attempt to immediately minimise some of the actions of allegedly ignorant and neglectful mothers. While these approaches appeared within *Public Health*, there was a larger underlying goal focused on educational reforms for working-class girls to prepare future mothers with scientifically and medically backed approaches to modern motherhood. Educational reforms for working-class girls were largely discussed within *Public Health* throughout

[2] Carol Dyhouse, "Social Darwinistic Ideas and the Development of women's education in England, 1880-1920," *History of Education* 5, no. 1 (1976); Ellen Jordan, "'Making Good Wives and Mothers'? The Transformation of Middle-Class Girls' Education in Nineteenth-Century Britain." *History of Education Quarterly* 31, no. 4 (Winer 1991).

the first decade of the twentieth century as a means of improving the next generation of mothers, and removing the ignorance that many claimed to have plagued the current generation of mothers.

Public Health was one of a number of medical journals available to MOHs, but it was the only journal printed solely for MOHs. In the first published volume, the President of the Society noted that the journal was to be:

> ... an authoritative scientific periodical, treating of all matters which concern the Public Health, and a faithful mirror of the opinions of the most eminent sanitarians of the present day; that it shall contain, as far as possible, an accurate account of every noteworthy advance in hygiene which has taken place during the year, and help in bringing together under one organization Societies engaged in the work of preventative medicine.[3]

Public Health engaged with public commentary on social and medical matters, and prioritised environmentalist perspectives over eugenic interventions that focused on the individual.[4] Articles and reports on IMR within *Public Health* addressed growing concerns in British society during the turn of the century, with MOHs referencing the health of the nation and race as a catalyst for the increased attention paid to infant health.

However, MOHs were regularly under-equipped to address the socioeconomic determinants of infant health. The duties of the early MOHs in the mid-nineteenth century were centred on sanitation as a means of improving mortality rates, but towards the end of the nineteenth century MOHs recognised that these initiatives were not enough to address infant mortality.[5] MOHs continued to push for improved sanitary measures within their districts, including the paving of roads, improving milk availability and quality, providing homes with clean water, and establishing better and more efficient systems of waste and sewage disposal, but failed to see the expected results from these preventative measures, which had previously celebrated for lowering the overall mortality rates across the country. This led many MOHs to the conclusion that something else was causing high IMRs across the country, and that merely addressing

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[3] Corfield W. H., "Forward," *Public Health* 1, no. 1 (1888): iii.

[4] The environmentalists of the nineteenth and early-twentieth century were proponents of improving public health by improving local sanitary and environmental conditions. MOHs regularly noted the correlation between insanitary surroundings and pollution with poor health outcomes in populations, therefore seeking to improve these conditions as a means of improving local health outcomes. See Dwork, 20; and Simon Szreter, *Fertility, class and gender in Britain, 1860-1940* (Cambridge; New York: Cambridge University Press, 1996): 201.

[5] Miasmic theory dominated the medical field during the introduction of MOHs, resulting in a focus on removing bad smells, noxious and decaying fumes, and other believed causes for disease outbreaks.

sanitation was not enough to curb high IMRs. MOHs began to adopt and advocate for increasingly interventionist measures within the articles published in *Public Health*.

The first article directly addressing infant mortality in *Public Health* was published in October 1893.[6] Alfred Hill, the MOH for Birmingham, lamented that across England the death rate had fallen by eight per cent while IMRs had only fallen by one per cent. Within Birmingham, if IMRs had fallen at the same pace as the death rates within his district, the average IMR for the last ten years should have been 148 deaths per 1,000 births, rather than the reported rate of 169. [7] A. Hill was certain that there was only one conclusion from his investigations:

> It is that the sanitary conditions to which attention has been directed cannot be shown to have had any evident connection with the infantile mortality.... I think it may be considered that social rather than sanitary agencies must be looked to for effecting the desired reduction in infantile mortality.[8]

A. Hill drew his conclusions from home visits to the 1,937 homes in Birmingham that recorded an infant death in 1892. Of all the infants who died, 41 per cent died due to "diseases of the digestive organs."[9] Worryingly, this high rate of intestinal-related deaths among infants was not unique to Birmingham. In England and Wales for the same years 43 per cent of infant deaths were ascribed to the same cause.[10]

Like England, France also experienced high IMRs, and a similar percentage of French infants died due to intestinal diseases. Noting the similarities in each case, A. Hill moved on to compare his findings with other European countries. In Norway he found a stark comparison. Only 12.5 per cent of infant deaths in Norway were attributed to intestinal diseases. The reason behind this dramatic difference was clear to A. Hill: Norwegian mothers routinely breastfed their

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[6] Prior to A. Hill's article, only two other articles had been published that mentioned infants explicitly. Both dealt with diseases in infants (cholera and typhoid) and not the more general approaches required to prevent infant deaths on a larger scale. The focus on individual diseases was more common in the earlier editions of the journal when MOHs were still primarily working within the realm of sanitarians and specific disease prevention. Throughout its publication, *Public Health* continued to expand its scope, and MOHs likewise experienced a broadening of the responsibilities of preventative health personnel. By the 1890's infant mortality was considered an important topic that was being discussed by district and county MOHs across the country, and thus began to be included in the article topics printed in *Public Health* alongside articles discussing waste disposal systems and diseases outbreaks and preventionist measures.

[7] Alfred Hill, "Infantile Mortality in Birmingham," *Public Health* 6, no. 66 (October 1893): 18.

[8] Ibid., 19.

[9] Ibid.

[10] Ibid.

infants, whereas English and French mothers were less inclined to do so.[11] The method of feeding, according to A. Hill, was a major contributor to infant health. Additionally, when mothers were required to breastfeed as a result of economic or social misfortunes, infant mortality was significantly reduced in areas that otherwise would have experienced high IMRs. During the Lancashire Cotton Famine in the 1860s, IMRs were significantly reduced to the point that they were the inverse of the near doubled adult death rates. The IMRs during the Siege of Paris (1870-1871) was likewise improved.[12] A. Hill concluded: "In peace and prosperity mothers neglect their children in one way or another; in war or adversity they are able, through suffering more themselves to give attention to, and more especially to suckle, their offspring."[13]

Infantile diarrhoea was the leading cause of infant mortality at the turn of the century, and due to its association with meteorological conditions and foul earth, the pathology surrounding diarrhoeal diseases straddled the line between miasmic and germ theory. Even during the "golden age" of bacteriology in the late nineteenth century, much of the discussion surrounding diarrhoea harkened back to the medical era dominated by miasmic vapours and the four humours.[14] Edward Ballard's seminal *Report on Diarrhoea* (researched and written during a period of extensive findings in bacteriology by Louis Pasteur, Robert Koch, Joseph Lister, among others) claimed that the cause of the disease was a microorganism that was released from the earth during warm periods. This yet to be discovered microorganism, according to Ballard, set about consuming foodstuffs following its release from the earth, and in this process released a type of chemical poison onto food. When ingested by humans, the poison reacted with the human body, causing diarrhoea.[15] Ballard's study was influential for understanding diarrhoeal disease transmission during the turn of the century. His theories and research prompted many MOHs to consider geological and meteorological conditions, which they claimed to give rise to the spread of seasonal, and epidemic diarrhoea.[16] More so, Ballard's work appeared in *Public Health* and was disseminated to MOHs across the country.

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[11] A. Hill, "Infant Mortality in Birmingham," 19. A. Hill made no note of the health of English and French mothers, or whether there were any indicators that French and English mothers were unable to breastfeed due to socioeconomic stressors. Rather, he attributed a lack of breastfeeding to be a result of the moral failings of the mother, in that artificial feeding was less taxing and an easier way to manage children which was preferred by lazy or selfish women.

[12] Ibid., 19.

[13] Ibid.

[14] Dwork, 36-37.

[15] Ibid.

[16] Ibid., 38.

In June of 1889, Ballard provided *Public Health* with a summary of his findings and research on diarrhoea. In it, he determined that there were three main contributing factors for diarrhoea. First, he described general conditions related to atmospheric and soil temperature, along with rain fall and air movements. The second set of conditions related to locality and included elevation, local soil compositions, population and building density, air circulation and general sanitation within the home, poor waste management systems, air pollution, and poor drinking water. The final set of conditions encompassed elements of everyday life, including social position, food, maternal responsibilities, and maternal occupation.[17] While the bulk of Ballard's research on diarrhoea—and his summary provided to *Public Health*—focused on the meteorological and environmental causes linked to epidemic diarrhoea, Ballard included a topic that became the main focal point of future MOHs attempting to curb IMRs.[18] Four years before A. Hill's article on infant mortality in Birmingham, Ballard was already indicating a link between the mother and infantile diarrhoea, providing another foothold for MOHs to blame working-class mothers for high IMRs rather than other environmental or socioeconomic factors.

However, Ballard himself did not claim that all working-class mothers were responsible for poor infant health outcomes. The main cause for high infant death rates that resulted from maternal neglect, Ballard claimed, was predominantly among illegitimate children, rather than their better cared-for and presumably legitimate counterparts.[19] Only under the care of working mothers did Ballard indicate that there might be some instances of neglect among married mothers, predominantly due to artificial feeding methods. He did not believe that there was enough evidence to indicate that there were significant cases of neglect among unemployed mothers. Four years later, in A. Hill's article on infant mortality, the distinction between employed and unemployed mothers was not made; however mothers of the working class were singled out alongside their prevalence for bottle feeding over breastfeeding.[20]

Although only comprising a small section in his overall summary of his work, Ballard's inclusion of artificial feeding and maternal neglect as causal factors in infant diarrhoea deaths continued to be a prominent focus for MOHs writing about infantile diarrhoea in *Public Health*. A. Hill's 1893 article further exemplified a link between artificial feeding and infant diarrhoea, and

[17] Edward Ballard, "The Etiology of Diarrhoea," *Public Health* 2, no. 14 (June 1889): 48-52.
[18] Ballard, 52.
[19] Ibid.
[20] A. Hill, "Infant Mortality in Birmingham."

towards the end of the century more MOHs were recording higher instances of artificial feeding in association with cases of infantile diarrhoea. In 1899 the MOH for Liverpool contributed two articles to *Public Health*, each of them describing the causes and preventative measures taken against seasonal diarrhoea. In his articles he claimed that infants who were bottle fed were up to 15 times more likely to die of diarrhoeal diseases during the summer than breastfed infants,[21] and the children with the best survival rates were those that were breastfed, such as the infants of Irish immigrants.[22] In both articles the prescribed remedy was better education for the poorer classes on the feeding of infants, directed towards the mother.[23]

The medical focus on the mother as the prime means of reducing infantile diarrhoea, and therefore IMRs, relied on the presumption that working-class mothers were ill equipped and poorly educated on the requirements of motherhood. During the turn of the century, middle-class sensibilities surrounding motherhood underwent a dramatic shift that was not reciprocated within working-class families or home life. The primary position of a middle-class woman within her household was no longer one as a wife, but as a mother whose responsibility was to raise the next generation of the British race.[24] Medical advancements also reshaped previously negative associations with motherhood held by the middle class, while the communication of medical knowledge reshaped the middle-class home during the nineteenth century. Armed with the knowledge of sanitation and a home that allowed foodstuffs to be kept cool and clean, middle-class families could successfully bottle-feed infants with more ease than their working-class counterparts.

Bottle feeding was initially encouraged by medical professionals and advice manuals created for middle-class mothers. Formula and other infants foods were advertised as popular household commodities, so much so that by 1883 there were 27 different brands of patented infant foods available in England.[25] When presented to the working and poorer classes, this popularisation of bottle-feeding resulted in adverse health outcomes that had not been anticipated by MOHs and physicians.[26] Middle-class mothers were expected to bottle-feed their infants with

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[21] E. W. Hope, "Summer Diarrhoea," *Public Health* 11, no. 6 (March 1899): 435.

[22] Like the instances described early by A. Hill during the Lancashire cotton famine, MOHs found that minority families, particularly the Irish and Jewish, were both economically and culturally more inclined to breastfeed. E. W. Hope, "Observations of Autumnal Diarrhoea in Cities," *Public Health* 11, no. 10 (July 1899): 661.

[23] Hope, "Summer Diarrhoea." 435. Hope, "Observations of Autumnal Diarrhoea in Cities." 662.

[24] Davin, 13.

[25] Ellen Ross, *Love and Toil: Motherhood in Outcast London, 1870-1918.* (New York: Oxford University Press, 1995), 142-43.

[26] Ibid.

the best infant formulas available on the market, but when working-class mothers attempted to do the same with the available milk substitutes they were lambasted by the very medical professionals who had once encouraged alternative feeding methods.

Working-class mothers struggled to keep up with the prescribed methods of motherhood now being forced upon them by a medicalised presumption that infant health was reliant upon the actions of the mother, and that the defining quality of a woman was her role as a caring and attentive mother. Yet, the struggles for working-class mothers did not go unnoticed by some. A speaker at an 1891 British Nurses' Association declared that a mother living in a third-story home that required water to be brought up from the ground floor tap was doing work equal to that of a day labourer.[27] Changing diapers was another additional workload on a new mother, when laundry could already account for up to ten hours of hard labour each week. It was more common for diapers to be dried out rather than laundered, allowing for two diapers to be soiled and then cleaned each day. However, by the end of the nineteenth century, advice books routinely suggested that a new diaper to be used after each changing; at times this could mean up to 24 diapers being used in a day. The inability for working mothers to meet this list of demands resulted in some women letting the child remain wet throughout the day, or for others to "hold out" an infant over a potty routinely throughout the day.[28]

Along with the manual labour demands that childrearing placed on working-class mothers, basic household management also proved to be, at times, a monumental task. Working-class wives of shift workers had to manage children and household chores between the shifts of her husband, children old enough to work, and any lodgers they may be accommodating.[29] The daily routines prescribed by middle-class advice manuals were near impossible for working-class women to maintain. In some instances, mothers were instructed to feed their children for 20 minutes (ten minutes per breast) at two-hour increments every day, leaving only 40-minute increments every hour to complete all other daily household chores. Little to no concession was given to the larger household necessities like laundry, which required more time and energy to complete.[30] These strict methods of motherhood found in advice manuals were difficult for even some middle-class

[27] Ibid., 137.
[28] Ibid., 137-138.
[29] Ian Buchanan, "Infant Feeding, Sanitation and Diarrhoea in Colliery Communities 1880-1911," In *Diet and Health in Modern Britain*, ed. Derek J. Oddy and Derek S. Miller (London: Croom Helm, 1985), 157.
[30] Jane Lewis, *The Politics of Motherhood: Child and Maternal Welfare in England, 1900-1939* (Montreal: McGill-Queen's University Press, 1980), 71.

mothers to follow. In one example, after a month of frustration and exhausting feeding times, one middle-class mother resorted to throwing all of her collected books by noted manual author Sir Frederic Truby King out of her home, and returned to a routine that kept her and her baby comfortable.[31] Set feeding times, along with other household duties stretched even the target audiences of these advice manuals thin. No wonder then that working-class mothers continued to underperform; the majority of these homes could not afford the cost of a clock or watch to track feeding times.[32]

Remedying the infant health crisis faced by MOHs at the turn of the century became focused on reforming the working-class mother. MOHs argued that sanitation measures had little to no major bearing on infant health, as IMRs had not improved during the majority of sanitary advancements since the mid-nineteenth century. Poverty was similarly ruled out as a primary factor for infant deaths that could be improved by public health measures. In 1905, T. Eustace Hill stated in his report on infant mortality that because of wage increases in the past few years, poverty could not be seen as the same threat to health as it once had. Similarly, it was routinely reported that areas under trade depression where wages would have been low or non-existent exhibited improved IMRs.[33] MOHs writing in *Public Health* used the examples of the Lancashire Cotton Famine of the Siege of Paris to remove claims from critics that poverty was a cause of high IMRs, despite routine reports from district MOHs that plainly indicated lower- and working-class districts had higher IMRs than the districts comprised of middle-class families. The argument from these more prominent MOHs was that families in poorer districts were squandering their resources and neglecting the needs of their children, whereas families in depressed regions were forced to provide the best means for their children.

Some MOHs stated that poverty might have a link to high IMRs, but then countered, claiming that these social worries were not the concern of the MOH. W. N. Barlow, the MOH from the Borough of Bootle, reported that while a large number of infant deaths were related to conditions of poverty, it was not the responsibility of the MOH to address these conditions.

> The public are apt to fix upon us, and we to assume, the whole responsibility for the excessive mortality from summer diarrhoea; but we must point out that however perfect the sanitation of a place may be, however clean the milk supply, until certain other causative factors are removed there will always be this excessive

[31] Lewis, 101.
[32] Ross, 144.
[33] Hill, "Infant Mortality," 632.

> mortality, and that one of these factors is poverty; and, as I said before, leave the solution of this problem of poverty to the social reformers.[34]

Social reformers, spurred on by the threat to national efficiency and further influenced by middle-class ideals of motherhood and household duties of the twentieth-century mother, began a focused tirade against working-class mothers who lacked the maternal knowledge to raise fit children. These reformers were rarely given space within *Public Health*, but their commentaries from other publications and available media bore a strong resemblance to many the medical practices and understandings of MOHs across the county. While the ignorance of mothers was accepted as a leading cause of infant deaths within *Public Health*, the majority of MOHs publishing in the journal were not convinced of the charges laid against maternal employment, nor were they fully supportive of the milk depot scheme championed by reformers as a remedy for high IMRs.

George Reid, MOH Staffordshire County, was one of the most outspoken proponents of the link between infant mortality and maternal employment. In Staffordshire, Reid reported, women in northern towns were engaged in the potting industries, thus taking them out of the home and increasing the mortality rate among infants. Conversely, women in the southern parts of the county, whose husbands were employed in coal mines and iron works, did not seek employment outside of the home, and thus boasted better infant survival rates. Reid was an outlier. The majority of those involved in the infant welfare movement noted that the children of working mothers fared better than those of unemployed women.[35] Reid did, however, have strong support from other prominent MOHs focused on solving the infant health crisis, such as Sir George Newman, and although not shared by all of his contemporaries, Newman's conviction that working mothers were endangering the health of their children influenced early historians of motherhood. The seminal work on working mothers by Margaret Hewitt in 1958 drew a similar conclusion to that of Newman and Reid: maternal employment posed an undisputed risk to infant health during the turn of the century.[36]

Despite the support from Reid and Newman, contributors to *Public Health* were hard pressed to effectively prove a link between maternal employment and high IMRs. In his 1893 article, Alfred Hill was surprised by the data that indicated wards in Birmingham, which boasted

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[34] W. N. Barlow, "Some Thoughts with Respect to the Duties of Medical Officers of Health in Relation to Social Questions," *Public Health* 18, no. 4 (January 1906): 220.
[35] Dwork, 36-37.
[36] Margaret Hewitt, *Wives & Mothers in Victorian Industry* (Connecticut: Greenwood Press Publishers, 1958): 122.

the higher rates of maternal employment had lower IMRs.[37] Five years later, a paper read by social reformer and writer on women's employment Clara E. Collet was republished in *Public Health* arguing against the claims that female employment was entirely to blame for high IMRs. Mining districts like those in County Durham routinely had higher IMRs, despite having some of the lowest rates of maternal employment, and industrial areas in the West Riding of Yorkshire (neighbouring County Durham) counted high instances of maternal employment but lower IMRs.[38] The employment of married women showed little consistency with IMRs, as Preston had both high IMRs and high instances of married women working outside the home, but Blackpool had lower IMRs and an even higher number of married women working.[39] Collet did not use this information to encourage married women to pursue work that would take them out of the home, claiming that "the industrial employment of married women with young children is an evil."[40] Instead, she used these statistics to draw attention to other social contributors to high IMRs such as overcrowded and insanitary living conditions experienced by the working class.[41]

Nearly 20 years later, *Public Health* was continuing to publish articles that ran counter to the popular arguments posed by Newman. In 1907 a statistical analysis on IMRs across the country found that "the relationship between industrial employment of married women and infant mortality [was] not... very visible."[42] The author argued that rather than focusing on maternal employment, the focus should instead be on reducing instances of epidemic diarrhoea by focusing on improved feeding practices. Another short article on a small study conducted in Birmingham indicated that IMRs among infants whose mothers worked was 190, a high figure, but not as high as the IMR for non-working mothers at 207. The article continued that the wages provided by working mothers supplemented the income of the husband in many working households, thus raising the family out of poverty and improving the survival rates of infants within the household.[43]

MOHs presented with conflicting data were unable to definitively single out employment of the mother as one of the chief causes of high IMRs. Vocal proponents of the dangers of maternal

[37] A. Hill, "Infantile Mortality in Birmingham," 19.
[38] Clara E. Collet, "The Employment of Women and Its Connection with Infantile Mortality," *Public Health* 10, no. 124 (August 1898): 374.
[39] Ibid., 378.
[40] Ibid.
[41] Ibid., 374.
[42] "Statistical Measures of Means Employed to Decree Infant Mortality," *Public Health* 19, no. 7 (April 1907): 408.
[43] "The Industrial Employment of Married Women and Infantile Mortality," *Public Health* 23, no 7. (April 1910): 229.

employment like Reid and Newman were rare in *Public Health*, with preventative measures against high IMRs instead being focused on the role of the mother in raising children, especially regarding infant feeding. Breastfeeding, as seen in the first article by A. Hill, was the preferred method of feeding as breastfed infants routinely experienced higher survival rates than handfed infants. Breastmilk, according to one article, contained all required nutrients and was removed from "noxious bacteria" linked with foul earth and seasonal diarrhoea outbreaks.[44] Not only was breastmilk more nourishing than available milk substitutes, but the risks of contamination were greatly reduced when bottles were removed from feeding practices.

Efficient and sanitary artificial feeding methods were hampered by two prevalent factors. First, many working-class mothers relied on condensed milk that was diluted in the home to feed infants they were not able to breastfeed. The nutritional qualities of condensed milks were significantly lower than those of cow's milk, with one article commenting that when diluted as instructed, condensed milk provided only 1/5 of an ounce of "flesh-forming material," compared with a whole ounce found in the same amount of cow's milk. Despite these shortfalls, such condensed milks were regularly advertised as being "specially recommended for infant feeding."[45] Additionally, while some condensed milks were produced from whole milk, many MOHs noted that the varieties often purchased by working-class mothers were the cheaper sorts derived from skimmed milk, which was removed of vital fats and proteins, and diluted beyond the recommended amount by mothers to extend the use of a single tin.[46] Cows' milk was seen as the best substitute for mothers' milk, but its usage presented MOHs with the second challenge in promoting efficient and sanitary feeding practices among working-class mothers.

Newman was a loud voice calling for reforms and improvements to Britain's milk supply. In 1903 he published *Bacteriology of Milk* with Harold Swithinbank, which became one of the more influential books on the milk supply in the early-twentieth century.[47] While primarily focused on the methods and techniques used in identifying bacteriological components of milk, the final few chapters of the book critiqued the legal frameworks in place to control milk quality, and the current structure of milk production and transport in the country. Milk was an important food source for infants, young children, and the infirm, but it also provided a dangerous vector for

[44] "Annotations: Infant Feeding," *Public Health* 7, no. 82 (February 1895): 197.
[45] "Annotations: Condensed Milks," *Public Health* 8, no. 96 (April 1896): 227.
[46] Hill, "Infant Mortality," 636.
[47] Dwork, 54.

disease. While not the primary route of transmission, Newman and Swithinbank stated that milk from a tuberculous cow could be a very probably means of disease communication; a concern made even greater due to the at-risk populations that primarily relied on cows' milk for nourishment.[48] Strictly relating to infant mortality, Newman stated that there was an intimate relationship between outbreaks of epidemic diarrhoea and the milk supply.[49] Newman drew many of his conclusions from his own experience as the MOH for Finsbury, and a year after *Bacteriology of Milk* was published, he also composed an extensive article for *Public Health* in which he described the importance of a pure and clean milk supply and its relation to improved infant health across the country.

According to Newman, there were four main routes of contamination within the milk supply: the farm, through transit to a milk shop, within the milk shop, and at the home of the consumer.[50] These routes of contamination were difficult for MOHs to address, and brought Newman to the conclusion that "... the whole question of high infant mortality is probably intimately related to the consumption of milk."[51] Control of the milk supply and the quality of milk provided to consumers was vital in addressing continued infant deaths brought about by seasonal diarrhoea. Yet, of the four routes of contamination identified by Newman, MOHs were more inclined to address the last two: milk that was contaminated either at its place of purchase, or within the home of the consumer. In response to this need, some municipalities began to establish and run milk depots, modeled loosely on the French *Goutte de Lait* system.

French milk depots run under the *Goutte de Lait* system developed by Dr. Léon Dufour were first established in 1894 and provided milk (both modified and not) to new mothers, and during the early twentieth century their success encouraged municipalities in Britain to adopt a similar system.[52] However, the British system was met with less enthusiasm from MOHs and patrons of the depots. In the first years of the twentieth century, the milk depot scheme that was operational in a few districts across Britain was increasingly questioned by MOHs and social commentators.

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[48] Cows with tubercles on their udders were linked to intestinal cases of tuberculosis in infants, which attributed to gastrointestinal distress and related illnesses. While MOHs attempted to identify these cows and remove their milk from circulation, often times it was argued that if mothers simply boiled their milk in their own homes any risk of disease transmission would be abated. Again, blame was placed on mothers for not treating milk. Swithinbank and George Newman, *Bacteriology of Milk* (New York: E. P. Dutton & Co. 1903): 210.

[49] Ibid., 361.

[50] George Newman, "The Milk Supply of a London Borough," *Public Health* 16, no. 5 (February 1904): 262.

[51] Ibid., 285.

[52] G. F. McCleary, "The Infant's Milk Depot: Its History and Function," *The Journal of Hygiene* 4, no. 3 (July 1904): 331.

Unlike the French model, the British depots did not provide health consultations with mothers, attending the depot was difficult for working mothers (especially if she had more than one child), milk was rarely supplied to the necessitous infants of the district, and even if the depots were able to feed a large number of infants, the costs of doing so were exorbitant. The largest depot in Britain was established in Liverpool, and in 1904 Newman recorded that the depot was capable of selling upwards of 30,000 bottles of sterilised milk a day. Working with such a large volume, and selling milk products either at cost or with minimal mark up, resulted in the Liverpool depot running at an annual loss of £500 by the end of 1904.[53]

Articles published around the same time of Swithinbank and Newman's *Bacteriology of Milk* recognised the need for a pure and clean milk supply, but many authors were critical of infant milk depots. A report presented to the Public Health Committee of the Glasgow City Council in 1903 and reprinted in *Public Health* argued that there was no evidence that IMRs had been positively influenced by the introduction of a milk depot.[54] The MOH for Paddington, Reginal Dudfield, was also unconvinced as to the effectiveness of infant milk depots, and drew his evidence from his observations at the milk depot in Paddington. These depots, according to Dudfield, were addressing the question of the infant mortality crisis from the wrong angle: "Parents who are without the moral calibre will not stint themselves so as to have money to spend on such supply, and even were the milk free, many would not take the trouble to fetch it."[55] The establishment of depots, Dudfield continued, "to my mind may be compared to the action of a gardener who cuts of the top of a weed, instead of grubbing up its roots."[56] While milk depots could provide milk to infants in larger cities like Liverpool, they ran at large deficits and did not provide infant health information.

Unlike milk depots, health visitors who conducted inspections and provided advice to mothers within the mother's home were a particular British institution. They were first established in 1875 by the Ladies Sanitary Association based in Manchester and Salford when the group began to provide penny lectures on the topics of household sanitation, and employed "respectable working women" to travel from house to house in the poorest areas of the city to provide information to new mothers.[57] By the 1890s more health authorities employed middle-class women

[53] Newman, 290.
[54] "Infant Milk Depots," *Public Health* 16, no 5. (February 1904): 302.
[55] Reginal Dudfield, "The Milk Supply of the Metropolis," *Public Health* 16, no. 6 (March 1904): 353.
[56] Dudfield, 353.
[57] Dwork, 125.

who were specially trained to complete the tasks of a health visitor.[58] In providing information to new mothers on proper feeding methods and household sanitation, health visitors began addressing a central issue faced by MOHs during the height of the infant mortality crisis: maternal ignorance.

Maternal ignorance became synonymous with working-class mothers. Middle- and upper-class women were accused by commentators of "shirking" their motherly duties by pursuing education or limiting family sizes once married, but the same accusations of ignorance and neglect were not applied to their mothering tactics. Working-class mothers who failed to rear their children were judged ignorant by MOHs and members of the higher classes. MOHs assumed that working-class mothers were making poor choices due to ignorance rather than from lack of resources and available options.[59] In Alfred Hill's 1893 article on infant mortality, he linked the ignorant mother to unimproved IMRs, and encouraged health visitors to correct the ignorant and "erroneous ideas" present in working-class households.[60] Calls to address the prevailing maternal ignorance that was hampering infant survival rates are found elsewhere in *Public Health*. A few years following A. Hill's first call to address infant mortality and ignorance, Dr. Kenworth made an address to the Southern Branch of the Society of Medical Officers of Health that boldly stated that maternal ignorance was the predominant factor in infant deaths.[61]

Rather than improve the material condition of working mothers, MOHs supported expanding the health visitor program. One of the most immediate means of maternal education supported by MOHs was the employment of health visitors who better addressed the shortfalls presented by the milk depots. Contributions to *Public Health* stated that though the introduction of health visitors to their districts had been recent, the results were promising. There appeared in a few instances to be evidence of a reduction in infant death rates.[62] During the first decade of the twentieth century, health visitors were celebrated in the pages of *Public Health* as one of the best educational provisions for current mothers. The act of visiting a home encouraged some working women to keep their house clean and follow instructions provided by the health visitor. An early account from a visitor stated that after an initial visit to a home that had registered a birth, she

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[58] Ibid., 126.
[59] Davin, 14.
[60] A. Hill, "Infantile Mortality in Birmingham," 20.
[61] Kenworth, "The Sickness and Mortality Due to Ignorance, and Its Remedy," *Public Health* 9, no. 107 (March 1897): 192.
[62] "Female Sanitary Inspectors," *Public Health* 17, no. 12 (September 1905): 781.

always left a leaflet that included information on infant management for the mother's reference. On the second visit it was almost always that case that some of the advice provided by the leaflet had been followed.[63] As one MOH reported to *Public Health*: "The mere fact that some of these ignorant mothers, knowing that one of these voluntary ladies may call in unexpectedly has a great moral effect."[64]

Health visitors, however, were not always met with acceptance. MOHs ascribed this hostility to, again, the ignorance of working mothers. Harold Kerr, the assistant MOH of Newcastle-Upon-Tyne, described one instance were a mother, after being told that the health visitor evaluating her home had no children of her own, "advised [the health visitor] to go away, and not come blethering about 'fresh hair and civilized milk' to a 'lady' who had buried seven bairns."[65] It was also difficult for some districts to afford to pay a health visitor. Not wanting to diminish the work conducted by health visitors, one MOH noted that nothing "was more important than the work of the health visitor at the present time, but if we were to eradicate the chief cause of infantile mortality it had to be in a more universal training of future mothers."[66] George Reid emphasised this perception when he claimed "Experience, I fear, compels one to come to the conclusion that it is hopeless to attempt to educate the present race of mothers."[67]

Educational reforms centred on the next generation of British mothers. Social Darwinists championed the idea that better educated mothers would stem the concerns rising around national efficiency at the turn of the century.[68] Reformers agreed that the next generation of mothers needed education, yet there were disagreements as to what types of education the modern mother should receive. Part of the middle-class push by education activists came from the rhetoric that an educated mother—who had received an education similar to that of a boy's education—would be able to better meet the demands of family life. The curriculum for young girls included subjects like geography, history, literature, and languages, rather than the previous popular subjects of dance and needlework, or later in the nineteenth century the inclusion of cookery and domestic

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[63] D. L. Thomas, "On Infantile Mortality," *Public Health* 11, no. 12 (September 1899): 815-16.
[64] Alfred Robinson, "The Trained Midwife; her Effect Upon Infantile Mortality," *Public Health* 22, no. 11 (August 1909): 400.
[65] Harold Kerr, "Modern Educative Methods for the Prevention of Infantile Mortality," *Public Health* 23, no. 4 (January 1910): 129.
[66] "The Reduction of Infantile Mortality Without Municipal Milk Depots," *Public Health* 19, no. 7 (April 1907):, 428.
[67] "The Attack on Infantile Mortality," *Public Health* 21, no. 1 (March 1908): 43.
[68] Diana E. St. John, "Educate or Domesticate?: early twentieth century pressures on older girls in elementary school," *Women's History Review* 3, no. 2 (1994): 191.

sciences.[69] Reformers of middle-class education cited the requirements for a middle-class woman to be a guiding influence or morality and temperance within her household as reasons for women to be enrolled in more academically robust courses and lessons throughout their schooling, yet these arguments were not made for working-class mothers.[70]

Middle-class education reformers believed that there were limits as to how much education, and the types of education, a woman should receive. An over-educated woman, it was feared, would become infertile and unable to breastfeed.[71] Proponents against women's education argued that intensive study lead to physiological detriments to bearing children, with an extreme example being pelvic distortions attributed to sitting during long reading and writing spells, resulting in possible birthing complications. Still, for many social reformers of the time the route to national efficiency was paved with women's education. The early works of noted eugenics supporter, Herbert Spencer, claimed that an educated mother would be better prepared for the responsibilities of motherhood, and that an uneducated or ignorant mother should not be tasked with raising children.[72] The question of a woman's role in society and how that related to her reproductive responsibilities was often tied into the discussion of women's education and the future of the race. Those who linked motherhood with racial evolution were also those who argued that education for women should prepare them for motherhood. An educated and cultured woman, it was argued, would pass her knowledge and "advantages of a trained mind" onto to her children.[73]

Educational reformers were not solely focused on middle-class education, and in fact, much of the discussion of maternal education within *Public Health* was directed towards the domestic education of working-class women as a means of improving national efficiency through reducing IMRs, rather than the elements of women's education more often involved in the discussions of social reformers. Social commentary surrounding women's education often centred on the middle-class woman and her pursuit of secondary education in previously masculine fields such as maths, geography, or history. Meanwhile, discussion of working-class education centred on preparing mothers to run their own homes, and on the more domestic-centred education that

[69] Jordan, 441-442.
[70] While middle-class education was moved out of the domestic sphere, working-class education reforms focused on the domestic capabilities of the mothers.
[71] Dyhouse, 43.
[72] Ibid.
[73] Dyhouse, 42.

middle-class reformers were trying to move middle-class mothers away from. In a recorded discussion later published in *Public Health*, the MOH for Preston, H. O. Pilkington, argued that the education for older girls who would soon become wives and mothers, was paramount in correcting their "ignorance in the laws of health."[74] Most in need of these instructions, Pilkington stressed, was the ignorant factory girl whose work kept her from home and her leisure time placed her on the streets "or in some place of amusement more or less innocent."[75] Pilkington was sure that improved education for these women would bring about changes, similar to those seen in the decorative arrangements in working-class homes.

> But just as of late years in the operative's home wall-papers of hideous design have been replaced by others of more artistic pattern and colouring, just as the pot dogs and other monstrosities in mugs which used to adorn the mantelshelf have given way to vases of graceful shape and elegant design, so knowledge will replace the ignorance to which I have alluded, and even the poorest will learn that a child—like a plant—requires fresh air, sunshine, pure water, and suitable nourishment.[76]

Given time, and proper directions, the working class would come to learn the requirements of childrearing, much as they had already learned the basics of acceptable home décor. Furthermore, working-class women would recognise their need within the home and domestic sphere.

The continued need for maternal education, for current mothers and young girls, was one of the recommendations included in the findings of the 1904 Inter-Department Report on Physical Degeneration. Portions of the report and its recommendations were included in the September 1904 issue of *Public Health* with supplementary comments provided for MOHs. While the report found no evidence—rather, no convincing evidence was presented by an interviewee—to suggest physical degeneration within the British population, the report indicated that the actions of irresponsible parents was a cause for distress among many children.[77] The report also included recommendations for sanitary improvements which related causes of poor infant health outcomes, yet these recommendations went largely unheeded. In total, the report issued 53 recommendations to improve the physical health of Britain that encompassed the improvement of environmental factors (such as overcrowding, smoke, pollution, insanitary surroundings, milk supply, etc.), or poor working-class social conditions (unemployment, crèches, adulterated food, employment of

[74] "Adjourned Discussion on Infantile Mortality," *Public Health* 7, no. 82 (February 1895): 172.
[75] Ibid.
[76] "Adjourned Discussion on Infantile Mortality."
[77] "Physical Deterioration," *Public Health* 16, no. 12 (September 1904): 788-89.

children and mothers, etc.). The recommendations more often endorsed and quoted by MOHs were those that involved the education of young girls and mothers on domestic hygiene and childcare.[78]

It was easier and cheaper to address the education of young girls and women employing health visitors and teaching of cookery, hygiene, and household management to women and girls than to address the continued environmental and socioeconomic influences of infant mortality.[79] Although the committee for the 1904 report included recommendations on the sanitary and social improvements necessary to gain to most benefit to the working-class, maternal ignorance rather than the disadvantages faced by working women was still singled out as a chief instigator of high IMRs. The committee relied on witness testimonies, rather than any original statistical collections or analyses, and the only trained physician on the committee was Dr. J. F. W. Tatham, who was more involved in the statistical aspects of public health, rather than the practical and on-the-ground work of MOHs.[80]

Due to the make-up of the committee and the questions asked of witnesses, the findings and recommendations of the committee relating to infant health and the role of the mother in infant survival rates were ultimately biased. All witnesses were questioned as to whether they believed educating mothers and girls on household and infant management was beneficial, yet when a witness stated the link between poverty and infant mortality, the point was not pursued, nor were contradicting testimonies examined. Miss Eves described the cost of condensed milk as the reason for its continued use by working-class mothers in infant feeding during her interview. Later in the report Dr. Robert Hutchinson claimed that the use of condensed milk was due to ignorance of the mother and *not* a result of poverty. Hutchinson was not challenged or questioned further on his statement, nor was Miss Eves invited to elaborate on her position.[81]

The continued focus on the education of mothers, and especially the next generation of mothers, was further emphasised by Pilkington during a meeting of the Society of Medical Officers of Health on 8 February 1907. According to Pilkington, part of the reason that young working girls were underprepared for managing a house and children was because they had no previous experience; "A girl brought up in the factory, and intended for factory work, spends little of her

[78] Davin, 26-27.
[79] Dwork, 19.
[80] Ibid., 18.
[81] Lewis, 89.

time at home, and takes no heed of household cares or duties."[82] As a result, when a factory girl becomes a mother and is responsible for managing her own household, Pilkington claimed she would merely think of her home as a place to rest and get her meals. Windows would be left closed, slops unemptied, beds unmade, and fireplaces closed up. These living conditions, while manageable for older residents of the house, were detrimental to the health of a newly born child.[83] The remedy suggested by Pilkington was the education of young girls; for lessons to be included as a part of their required elementary schooling that encompassed simple instructions on the topics of household management, simple cleanliness, sick nursing, and the proper feeding and care of infants.[84]

Preventing the transfer of ignorance to the next generation of mothers was deemed, by Pilkington and likeminded MOHs, as "the great hope of a permanent and marked improvement in the future."[85] Pilkington believed that after receiving her education, the no longer ignorant factory girl had at her disposal new habits with which to manage her household and protect vulnerable infants. In the discussion that followed his paper, other MOHs agreed that girls needed better educations in order to curb the worrying IMRs across the country. Significantly, these educational measures were aimed only at working-class girls. Mothers of the upper classes, as Dr. R. Musgrave Craven from Westmoreland stated, seldom had their children die due to causes related to ignorance.[86] Dr. Butler from Willesden agreed; "It was among ignorant people that the deaths occurred."[87] Educational initiatives became more widespread during the early twentieth century, and the focus on the mother further cemented her role as the chief protector of infant life. MOHs that recognised environmental factors as significant causes of infantile diseases like epidemic diarrhoea were overruled or overshadowed by those writing about maternal ignorance, and many more were inclined to support education initiatives over broad sanitary and social reforms.[88]

Yet, enforcing educational reforms was difficult to implement, partially due to the associated costs, but also as a result of criticisms posed by educational and social activists of the

[82] Pilkington, "The Reduction of Infantile Mortality Without Municipal Milk Depots," *Public Health* 19, no. 7 (April 1907): 410.
[83] Ibid., 414.
[84] Ibid., 421.
[85] Ibid.
[86] Pilkington, 426.
[87] Ibid., 427-28.
[88] Davin, 26.

time. Prior to the release of the 1904 Report on Physical Degeneration, a committee member suggested a program that would see the parents of working-class girls apply to School Managers for permission to keep their daughters at home for half of the week to assist their mothers with the more strenuous of household chores, such as laundry and baking days. The program enlisted support from some education reformers, but opposition to the proposal was fierce. Opposed education reformers claimed that a program like this could easily devolve into domestic slavery for young working-girls.[89]

There were on-the-ground difficulties in arranging classes for young girls. The large-scale and up-to-date equipment bore little resemblance to the equipment available to girls in their own homes, and was often an expensive investment for schools across the country. Classes in cookery were also expensive, with girls expected to pay to cover the cost of ingredients for the new recipes that would rarely be implemented in their homes due to the fear of wasting costly ingredients.[90] One school inspector reported that in a school in the North of England, an entire class of 18 girls were taught a lecture "On Roasting Meat" which produced one pork chop. Other concerns were raised when girls were taught the cooking of "saleable goods," such as toffee and sweet buns, rather than cheap and nutritious domestic staples.[91] In his paper, Pilkington had commented on the fact that young girls needed to learn cookery on wholesome and nutritious foods, and the most economic means of food preparation.[92] Following the inclusion of cookery and other domestic subjects in schools for girls it became apparent that, like the problems surrounding infant mortality, the solution was not a simple one-step change. Local circumstances and community dynamics made it difficult for widespread infant health initiatives to take hold.

Public Health provided a platform for MOHs to discuss public health initiatives more removed from the readership of other popular medical journals, and provided a connection point between MOHs across the county. The articles published in *Public Health* by MOHs represent the communication occurring within a specific medical community that was uniquely positioned to influence political and medical policies. The focus on mothers, particularly working and working-class mothers, is significant. Within the main repository of MOH communications and practices, the overwhelming focus of the faults of the mother, when addressing infantile mortality,

[89] Charles Booth was one of the more prominent supporters of this program. Dyhouse, 48-49.
[90] Davin, 27.
[91] Jordan, 24.
[92] Pilkington, 421.

demonstrates how societal anxieties and class sensibilities permeated a specific medical community on a national scale.

CHAPTER 2

In his 1910 report on infant mortality issued by the Local Government Board, the prominent medical officer on infant health, Arthur Newsholme, singled out "extreme" counties that exhibited high IMRs and compared these administrative counties to their low scoring counterparts. Using mortality rates and other data collected from the 1908 MOHs annual reports from the counties and sanitary districts across England and Wales, Newsholme reported on the prevalent causes of high IMRs alongside methods of combatting and improving infant health outcomes across Britain. County Durham was one of the worst performing counties regarding IMRs in Britain, second only to Glamorgan, a rural mining district in south Wales.[1] With the highest IMRs in England and Scotland, it was apparent to Newsholme that counties like County Durham were severely behind not only in the more recent infant healthcare practices, but also in remedying basic sanitary measures that other counties had been already addressed. The MOH for County Durham, T. Eustace Hill, was very much aware of his county's poor infant health record, and his reports routinely referred to the methods he recommended to his MOHs, and the methods employed by district MOHs to combat high IMRs within his county throughout the first decade of the early twentieth century.

The measures highlighted by Hill in his annual reports bore a resemblance to the measures and precautions being touted in the pages of *Public Health* during the first decade of the twentieth century. The primary culprit responsible for high IMRs across the county was, to Hill's mind, the ignorant and neglectful mother. Much like his colleagues across Britain, Hill championed education, yet his focus was on the more immediate benefits brought about by health visitors rather than the educational reforms endorsed more readily by the articles in *Public Health*. Nonetheless, Hill's reports during the first decade of the twentieth century indicate that he was heavily influenced by the same trends of maternalism and mother blaming expressed by other prominent and influential MOHs such as Newsholme and Newman, and those that were extolled by *Public Health*. Moreover, Hill acted in the same fashion as the leading medical contemporaries by ignoring statistics that indicated that improved infant health depended on a number of socioeconomic factors. Instead, Hill, emboldened by the milieu of the health visitor and positive

[1] Local Government Board and Arthur Newsholme, *Thirty-Ninth Annual Report of Local Government Board, 1909-10. Supplement to the Report of the Board's Medical Officer Containing a Report by the Medical Officer on Infant and Child Mortality* (1910), 8-9, from the Wellcome Library. https://wellcomelibrary.org/item/b2136168x.

reports from selected district MOHs within County Durham, became enthralled with the work of the health visitors, obsessively celebrating their short term successes while downplaying the necessity for other preventative measures to guard against high infant death rates.

Hill was the county MOH throughout the 1890s, the decade that saw a rise in vocal concerns surrounding infant health within public discourse and medical literature like *Public Health*. In the reports issued by Hill during this decade he was more holistic in his approaches to infant health. Following the increased attention paid to infant mortality in *Public Health* and reports published by district MOHs in County Durham, however, Hill began to incorporate positive reports for the use of health visitors within the county into his own annual reports. Hill's annual reports, as county MOH, differed from the reports provided by district MOHs. Whereas district MOHs wrote their reports to their local councils, Hill's reports were issued to the Health Committee of the Council of the County Palatine of Durham, and as such, his reports included a section where he summarised the health statistics of the county in general, including discussion on disease outbreaks, mortality figures, sewer and sanitation updates within districts, and other public health. In this section he mentioned the approaches taken by medical officers to combat high IMRs within their districts as they related to the overall infant health of the county. He highlighted MOHs that encouraged educational reform either by the usage of pamphlets provided to new mothers or the employment of health visitors.

Hill's approach to infant mortality changed over time, first identifying environmental causes linked to infantile diarrhoeal deaths in the 1890s but quickly shifting towards a more mother-centric approach during the 1900s. As his interests and focuses changed, so too did the MOHs that he mentioned in his summaries of infant health. The MOH John Taylor from the prominent mining district Chester-le-Street RD was regularly featured in Hill's summaries during the 1890s when discussing the causes and effects of high diarrhoea rates within the county. However, Taylor did not adopt health visitors during the first decade of the twentieth century when Hill focused more on mothers and interventionist reforms. As a result, Taylor disappeared from the summaries compiled by Hill. As MOHs previously mentioned by Hill were removed from the summaries, other MOHs that shared Hill's enthusiasm for health visitors were featured more readily. However, one MOH was routinely singled out by Hill. The MOH from Sedgewick RD, Frederick Hunton, was the only MOH Hill included in his reports that was opposed to using health visitors, and was the only MOH that presented differing approaches to curbing IMRs within his district that

were not endorsed by Hill. Any other dissenting or differing MOHs were not included by Hill, and Hill chose to include passages from Hunton's reports that emphasised his eugenic leanings with regard to infant welfare.

In contrast to the singular opposition provided by Hunton, Hill included a number of MOHs who either reported favourably on the use of health visitors within their districts, or the calls by other MOHs who believed the work of a health visitor was beneficial to their district. W. Mussellwhite, the MOH for Spennymoor UD, routinely requested the use of a health visitor from his council, but was denied year after year. Other reports from districts such as Brandon and Byshottles UD, Stockton RD, Southwick UD, Stanley UD, Wickham UD, and Shildon UD all reported favourably on the work of their health visitors throughout the first decade of the twentieth century. Shildon was the only district employing a health visitor that did not experience increased IMRs during 1911, when warm summer temperatures exacerbated IMRs across the county. Overwhelmingly, the work of the health visitor was overruled by socioeconomic and climactic determinants of infant health with MOHs making no mention of such in their reports.

County Durham was a rural county that relied heavily on the coal mining industry to support the predominantly working-class population. The Durham Coalfield, which comprised half of the Great Northern Coalfield (Figure 2.1), encompassed a large portion of the county, and stretched into the North Sea along the coast.[2] Across the coalfield, coal seams regularly broke the earth's surface or were buried just below, encouraging a coal industry that rapidly expanded throughout the late-nineteenth and early-twentieth centuries. Coal production in the Northeast contributed to one-third of all coal on the global market in 1913.[3] At the turn of the century, colliery sites sprung up across the county, with 197 new collieries being opened between

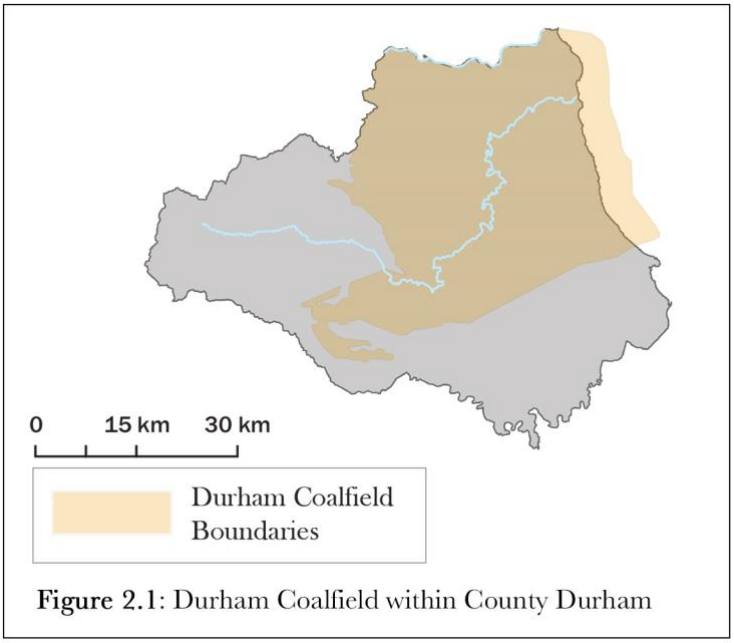
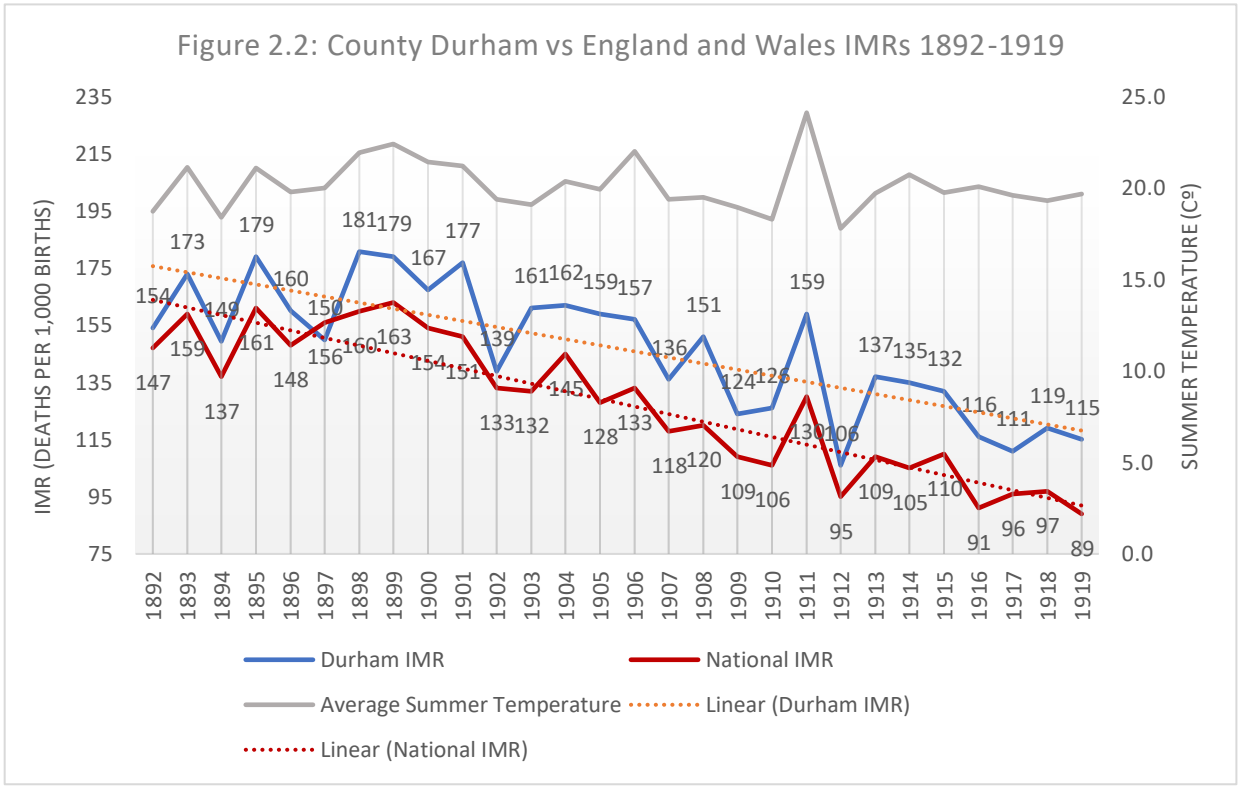


Figure 2.1: Durham Coalfield within County Durham

[2] Sources for maps and graphs are available in Appendix D.
[3] M. J. Daunton, "Down the Pit: Work in the Great Northern and South Wales Coalfields, 1870–19141," *The Economic History Review* 34, no. 4 (1981): 578.

1892 and 1919. Including collieries that had been in existence before the final decade of the nineteenth century, over 655 collieries were in business before 1914, providing steady and high paying wages to working men across the coalfield. A coalminer in Durham could expect to take home roughly 2s. 9d. per day, compared to agrarian workers' wages which could be anywhere from 3s. to 15s. a week, depending on the time of year and location of the work.[4] Yet despite the consistent and higher pay, infant health was worse in the coal mining regions in Durham than other less economically successful counties.

Compared to the national averages, County Durham routinely lagged behind infant health outcomes throughout the early-twentieth century, and experienced a more dramatic increase to IMRs during the warmer summers of 1898-1901. The trend of above-national-averages continued until and past the First World War (Figure 2.2), with significant spikes to IMR being present during particularly warm and dry summer months (or third quarter months; July, August, and September) in 1898-1901, and 1911.[5] Other counties were not immune to temperature variances on IMRs, as seen in the overall national increased in Figure 2.2 for warmer years, but County



[4] John Burnett, *Plenty & Want: A Social History of Diet in England from 1815 to the Present Day* (London: Scolar Press, 1979), 51, 35.

[5] Sources for maps and graphs are available in Appendix D.

Durham exhibited a more pronounced increase during these same periods, often tied to diarrhoeal outbreaks. The direct association between infantile diarrhoeal deaths and temperature was a large concern for MOHs and infant health advocates, leading many MOHs to focus on domestic sanitation as a means of curbing diarrhoeal deaths among infants during particularly warm summers. By 1911, some MOHs had been able to implement enough suitable sanitary measures to prevent notable increases in IMRs during warm summers.

Yet compared to London, a region with higher population densities and wider socioeconomic and societal stratification, County Durham still experienced higher IMRs during the warm summer of 1911 (Figure 2.3).[6] Whereas previously poor performing and predominantly working- and poorer-class areas in London were able to find ways to improve IMRs during the first decade of the twentieth century, County Durham fell short of such improvements. Districts in London and County Durham that did not experience increased IMRs during the warm summer of 1911 passed the "sanitary test," first introduced in Graham Mooney's examination of 1911 temperatures and IRMs in London.[7] In his examination of London, Mooney demonstrates that

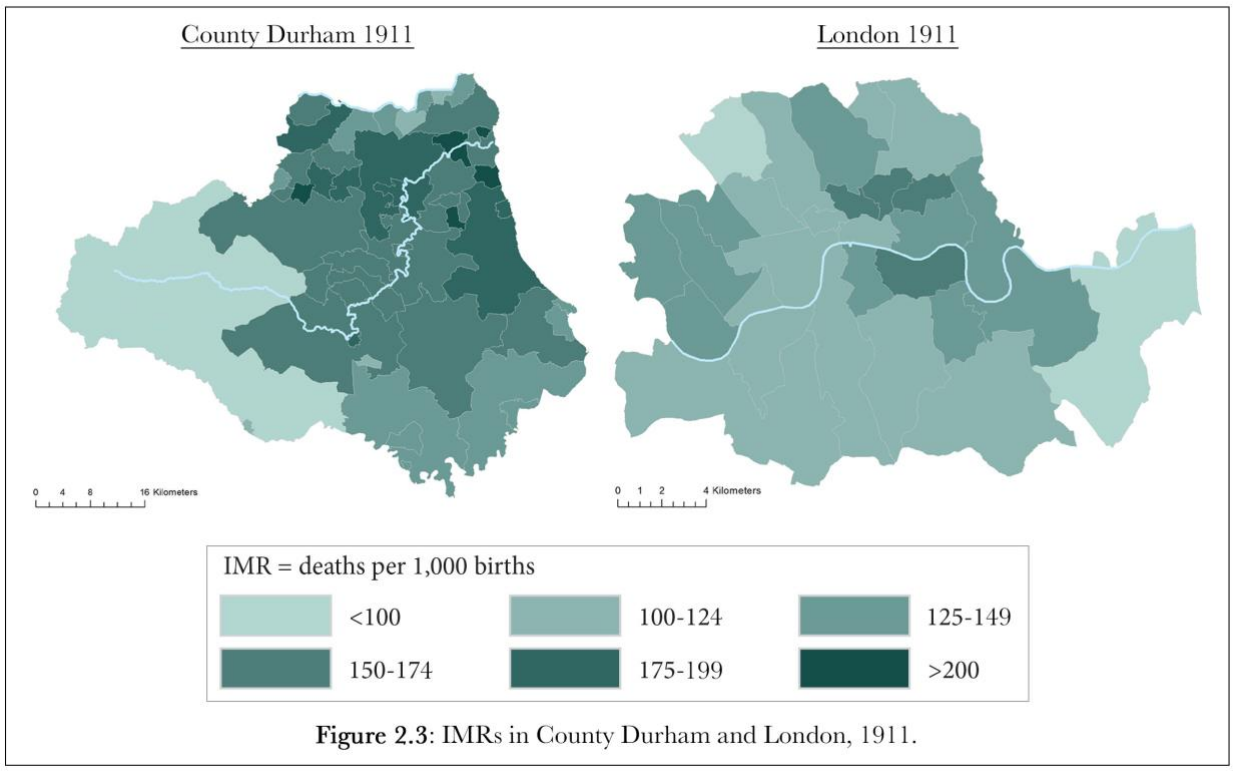


Figure 2.3: IMRs in County Durham and London, 1911.

poorer districts continued to experience IMRs that were higher during warm summers, indicating

[6] Sources for maps and graphs are available in Appendix D.
[7] Mooney, 158–174.

that sanitary measures were not being met within these areas.[8] The districts most affected in London were those that featured overcrowded homes with poor sanitation, with these districts often being home to the working and lower classes.

The districts within County Durham that boasted large coal mining operations were also those that exhibited higher IMRs during 1911 and were the ones that struggled to pass the sanitary test (Appendix C).[9] Only 11 districts out of the 44 with available data improved their IMRs in 1911 compared to their 1905-1910 IMR average, and seven additional districts recorded IMRs that were not significantly higher than their 1905-1910 averages. In total, 18 of 44 districts in County Durham passed the sanitary test in 1911. Of the districts that failed, 11 districts recorded IMRs that were between 7-20% increases from their 1905-1911 average, and significantly, the majority of these districts did improve IMRs compared to the last warm summer in 1906 when the average summer temperature rose to 22º C. Seven of these districts experienced IMRs in 1911 that were lower than or equal to the IMRs recorded in 1906 when the summer was 2º cooler, indicating that important sanitary improvements were being met. Over half of the districts in County Durham passed the sanitary test or demonstrated that they were improving their local sanitation conditions by 1911.

The remaining 15 districts in County Durham failed the sanitary test and predominantly did not exhibit improved IMRs since 1906. Stockton RD was the only district that improved their IMR from 1906, going from 158 infant deaths per 1,000 births in 1906, to 148.23 in 1911. However, it is important to note that in 1911, 71 infants died in Stockton, compared to the 479 born. Had Stockton experienced five more infant deaths in 1911, it would have experienced the same IMR as it had during the warm summer of 1906. Two other districts experienced IMRs that were similar to those recorded in 1906. The IMR in Annfield Plain UD for 1911 was 178.81; only two points lower than the IMR in 1906 which was 181. Had one more infant died in 1911, the IMR would have risen two points to 180.8, matching the 1906 IMR. Alternatively, had one less infant died in Darlington RD in 1911, it would have experienced the same IMR from 1906.[10] Yet the majority of districts that failed the sanitary test did so with IMRs that were significantly higher

[8] Ibid., 172.
[9] Mike Gill, email correspondence with author, March 27th, 2017.
[10] In 1911, 34 infants died in Darlington. Had 33 died, the IMR would have dropped four points, to 128.4.

than the 1906 totals, and five of the districts experienced IMRs that indicated that almost one out of every five children born that year died.[11]

Colliery towns and villages were notoriously insanitary places, rendering them more susceptible to climatic influencers over IMRs, but it was more than just local sanitation that threatened the health of infants within colliery households. Artificial feeding was regularly used in coal mining areas, primarily due to the unique household stresses experienced by colliery women that could result in the inability for a woman to lactate. Shiftwork meant that husbands, working sons, and lodgers would be in and out of the home at different times of the day, making scheduled feedings for infant difficult for mothers trying to feed other family members.[12] Mothers were more likely to suffer adverse effects from malnourishment, as even if her husband's wages were available to her (and did not "dissipate" at the husband's local pub) the husband received the larger share of food at meal times, with children being cared for next, and the mother left with what remained.[13]

Working-class mothers, and especially mothers in colliery towns and villages who struggled to maintain regular feedings or produce enough breastmilk for their children relied heavily on patented infant formulas and condensed milk to supplement or entirely replace breastmilk. Condensed milk, favoured by working-class households, could be diluted to stretch the budget further than with cow's milk and condensed milks did not sour as quickly. However, the condensed milks regularly purchased by working-class mothers were often made with skimmed milk which significantly reduced the nutritional value of the milk, and were sweetened with additional sugars, which in turn attracted flies. Not all households owned tin openers either, and some resorted to having shop owners open their tins of condensed milk upon purchase before being brought back to the home and stored in an often small and crowded kitchen.[14] The MOH from Houghton decried the conditions of workmen's pantries, citing the small spaces and poor ventilation as the cause for much of the rapid decomposition that occurred in the warm summer months.[15] Spoilage of foods used to feed infants presented a challenge for working mothers especially during the warm summer months of July, August, and September. It was routinely in

[11] These districts were: Leadgate UD, Hetton UD, Sunderland RD, Seaham Harbour UD, and Chester-le-Street UD.
[12] Buchanan, 157. Ellen Ross also mentions some of the difficulties experienced by working-class women in keeping regular feeding times due to many households not being able to afford clocks or timekeepers. Ross, 144.
[13] Buchanan, 157, and Ross, 33.
[14] Buchanan, 158.
[15] Ibid., 158–59.

these months that diarrhoeal deaths among infants peaked during epidemic years. Yet it was not spoilage alone that caused diarrhoea epidemics and heightened IMRs during warm summers.

If food spoilage due to warm temperatures was the only contributing factor to infant mortality, warm Junes may have resulted in just as many diarrhoeal deaths from food spoilage and the souring of milk as much as any other warm summer month. However, warm Junes regularly had lower IMRs and cases of diarrhoeal deaths compared to July and August. Food spoilage could have played a part in increased IMRs, but the overall increases were due to another factor. Increases to IMRs and instances of diarrhoea correlated directly to increased fly populations brought about by increased summer temperatures. In their annual life cycle, house flies (*Musca domestica*) in England did not hatch until late June, explaining why higher IMRs were not seen until July and August. Temperatures also contributed to fly populations in that warmer summers accelerated the growth rate of house flies, resulting in more adult flies throughout July and August compared to cooler summers.[16] Only in the months of July and August, following accelerated growth cycles in June, did enough of an adult population of flies exist to spread diseases that were detrimental to infant health within the mining communities of County Durham.

The fly problem was known to some MOHs during the period, but not all were convinced of the sanitary problems introduced by fly populations. In County Durham, the MOH from Chester-le-Street RD remarked in 1907 that the housefly was "a very objectionable visitor," and while he harboured a few doubts that the housefly was to blame for the spread of diarrhoea, he was still in favour of removing the pest from as many dwellings as he could.[17] Some MOHs were more convinced of the link between houseflies and diarrhoea. In 1901 the MOH from Gorton (Manchester) reminded his local council that he had been convinced of the flies' significance since his observations in 1898. The appearance of houseflies in July corresponded with increased instances of typhoid fever and epidemic diarrhoea, so much so that the MOH stated: "The annual epidemic of these two diseases begins and ends with the appearance of the domestic fly."[18] By 1910, the prominent MOH for Manchester, Dr. Niven, had definitively proved the link between

[16] Warmer summer temperatures shortened the average maturation period of an adult fly from 22-25 days to 8-11 days. Buchanan, 161.

[17] Rural District Council of Chester-le-Street and John Taylor, *Thirteenth Annual Report of the Medical Officer of Health on the Health and Sanitary Condition of the District for the Year 1907* (1908), 28-29, from the Wellcome Library. https://wellcomelibrary.org/item/b29108093.

[18] Nigel Morgan, "Infant Mortality, Flies and Horses in Later-Nineteenth-Century Towns : A Case Study of Preston," *Continuity and Changes* 17, no. 1 (2002): 99.

increased disease outbreaks and fly populations. To do so, Niven set up flytraps across the city and recorded the numbers of houseflies within each trap every day during the summer months between 1904-1910.[19] Prior to the work of Niven, and of bacteriologists that followed him, a minority of MOHs were concerned with controlling fly populations as a means of decreasing diarrhoeal outbreaks.

During the late-nineteenth and early-twentieth century, MOHs were more concerned with the meteorological and miasmic indicators for epidemic diarrhoea outbreaks. As mentioned above, diarrhoea was a unique disease in that its medical conceptualisation blended both the fading facets of miasmic theory and the new tenents of germ theory. This was the case for Hill when he first discussed the disease and its relationship to infant health. In his description of warm summers and the resulting high rates of infantile diarrhoea, Hill echoed the findings of Ballard's 1888 *Report on Diarrhoea*. In Hill's account, the germs that caused epidemic diarrhoeal outbreaks were "activated" by warmer temperatures, and then released from the soil into the air.[20] In the 1890s, Hill believed infant mortality was largely influenced by diarrhoea, which he concluded was almost entirely dependent on summer temperatures. Quoting the MOH from Chester-le-Street, Hill reported that warm summer temperatures caused the earth to be heated to a point where it emitted an "aerial poison," which was the primary cause of infantile diarrhoea.[21]

Certainly, early in his career Hill included temperature as a major factor in IMRs, and while he was featuring MOHs that supported his claims, he also recorded other causes that contributed to high IMRs in County Durham. In 1892 he noted: "Improper feeding, carelessness, neglect, and insanitary surroundings are all concerned in producing the great mortality among children."[22] He reaffirmed this sentiment a year later when he lamented that the chief causes for the "massacre of the innocents" were predominantly preventable issues concerning unsanitary surroundings, improper feeding, and neglect.[23] According to Hill, predisposing factors in infant

[19] Ibid., 100.

[20] Council of the County Palatine of Durham and T. Eustace Hill, *Summary of the Annual Reports of the Medical Officers of Health for the Year 1895* (1896), viii–ix, from the Wellcome Library. https://wellcomelibrary.org/item/b29172883.

[21] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M.B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1896* (1897), xiii, from CC/Health 535, Durham County Records Office.

[22] Council of the County Palatine of Durham and T. Eustace Hill, *Summary of the Annual Reports of the Medical Officers of Health for the Year 1892* (1893), vii, from the Wellcome Library. https://wellcomelibrary.org/item/b29172858.

[23] Council of the County Palatine of Durham and T. Eustace Hill, *Summary of the Annual Reports of the Medical Officers of Health for the Year 1893* (1894), ix, Wellcome Library, https://wellcomelibrary.org/item/b2917286x.

health, such as unsanitary surroundings and overcrowding, improper feeding, and parental neglect, were yearly causes for high IMRs, but during epidemic years, warmer temperatures in the summer months created conditions ripe for serious diarrhoeal diseases among infants. During a particularly bad summer in 1895, Hill reflected that had the county addressed poor local sanitary conditions and educated parents on the basics of domestic sanitations, the high IMR of 171 deaths per 1,000 births could have been avoided.[24] In 1898—another warm summer with the average temperature between July-September reaching 22º C—Hill again reported on the prevalence of diarrhoea and related deaths among infants, and how they were preventable.

In his 1900 report, however, Hill shifted his focus from continually singling out the unsanitary conditions of the districts and the significance of climatic conditions, and moved towards a call for education reform centred on working-class mothers.

> The infant mortality in our populous districts is so excessive, and so much of it preventable, that it is the duty of local authorities to adopt any means at their disposal which may tend to reduce it; and by the teaching of domestic hygiene in our elementary schools, by the employment of lady health visitors, and by the distribution to mothers of suitable leaflets on infant feeding and management much can be done in that direction.[25]

This shift towards education was reflective of national trends, but also indicated a shift in how MOHs thought about infant deaths. They still recognised sanitation as an important factor in infant health outcomes, and they noted the living conditions of families routinely as another significant factor that contributed to infant death, but now an additional element was raising concerns and becoming more prevalent in Hill's annual reports.

By 1905, Hill had completely adopted the opinion that mothers were to blame for high IMRs in the country, despite the dire sanitary state of many of the coal mining districts. On 24 February he made his inaugural presidential address to the Northern Branch of the Incorporated Society of Medical Officers of Health focused on infant mortality.[26] While still acknowledging the connection between temperature and IMRs, Hill believed that there was something else apart from sanitation and living conditions influencing the health outcomes of infants across the county. Hill

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[24] Council of the County Palatine of Durham and T. Eustace Hill, *Summary of the Annual Reports,1896* (1897), viii-ix.

[25] Council of the County Palatine of Durham and T. Eustace Hill, *Summary of the Annual Reports of the Medical Officers of Health for the Year 1900* (1901), ix-x, from the Wellcome Library. https://wellcomelibrary.org/item/b29524222.

[26] Hill, "Infant Mortality," 623.

attributed high IMRs in County Durham to the social and domestic lives of afflicted families.[27] These families, Hill noted, were of a particular social standing, stating that "excessive infant mortality [was] entirely confined to the working classes and the poor."[28]

Hill described influences of the birth rate, heredity, illegitimate births, infant insurance schemes, poverty, insanitary conditions, employment of women, overcrowding, improper feeding, and neglectful and inexperienced mothers and being persistent causes of high IMRs.[29] He drew this list of causes from the district MOH reports, but despite including all causes suggested by his district MOHs, he was not entirely convinced that each of these causes were significant. Hill quickly eliminated concerns for the birth rate, arguing that while higher IMRs were linked to higher birth rates in some areas, these deaths were predominantly due to the living conditions and unsanitary surroundings. Factors contributing to infant deaths such as heredity and illegitimate births occurred to before the birth of the child, and as such, Hill believed that MOHs had little control over these outcomes.

Hill was insistent that infant insurance schemes were only a concern for illegitimate children, and even in those cases, insurance had a minimal influence on the mortality rate. Likewise, poverty had little bearing on infant death rates. Increased wages and reduced food costs had moved more of the population out of the realm of poverty, and Hill also cited recent statistics that indicated economic depressions improved IMRs.[30] Although Hill had earlier indicated that sanitation was a concerning factor in areas with higher birthrates, he argued that across the country improved sanitation had eliminated almost all cases of pollution that regularly caused increased IMRs. The final element that was regularly touted by MOHs was the employment of women. He noted that employment levels differed district to district within County Durham and across the country, with some areas of high employment exhibiting low IMRs.[31]

Regarding overcrowding, Hill stated that generally, this was not a concern for the country. Registrar-General reports indicated that instances of overcrowded residences had dropped significantly, leading to a significant reduction in the number of residents that recorded more than two people per room occupancies in homes across the country. However, the Northeast of

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[27] Hill, 629.
[28] Ibid., 631.
[29] Ibid.
[30] Ibid., 631–32. Hill made no reference to the cost of living during the period, nor if it had raised along with working wages. The statistics alluded to by Hill were repeated in articles published in *Public Health* that indicated French infants had higher survival rates during the Siege of Paris due to increased maternal attention and breastfeeding.
[31] Hill, "Infant Mortality," 634–35.

England, particularly the coal-mining districts in County Durham were a significant exception to this trend.[32] Quoting from the recent census, Hill explained that in coal mining districts, and especially rural coal mining districts, overcrowding was increasingly prevalent. Districts in County Durham such as Chester-le-Street, Lanchester, and Easington that boasted a large coal mining industry recorded as much as 40 per cent of their population living in overcrowded conditions.[33] This overcrowding, according to Hill, was the fault of colliery owners who provided homes for miners and their families. The building process for these homes, unfortunately, resulted in overcrowded conditions as owners cut whatever corners were possible to provide the cheapest accommodations for their workers.[34] These conditions, Hill claimed, were significant contributors to the high IMRs suffered by his county, summarising:

> Personally, I am convinced that a serious factor in the continued high infant death-rate in the county of Durham is the gross overcrowding in the mining districts, which is being aggravated rather than reduced.[35]

Despite the link between the overcrowded conditions in mining districts, Hill was ultimately drawn to the same presumptions as his contemporaries, concluding: "...suspicion is therefore directed to the improper feeding and management of infants as being the chief cause of the high mortality among them."[36] Indeed, Hill was not alone in placing the majority of the blame on the actions of mothers. The prominent Medical Officer Arthur Newsholme also recognised environmental factors as major contributors to IMRs, but decided that the primary cause for infant illness and death rested with the mother and her inability to properly feed and care for her child.[37] The link between improper feeding and infant death was linked in two ways to the increased reliance of mothers on artificial milk. First, bottles and feeding tubes used to provide milk to infants required frequent cleaning in hot water to remove organisms that caused intestinal distress. MOHs attributed seasonal diarrhoea, especially in the summer months, to the artificial feeding with dirty bottles and polluted milk. Secondly, infant formulas or milk substitutes available to working-class mothers were often of poor quality and significantly lacking in vital nutrients and

[32] Ibid., "Infant Mortality," 633.
[33] Ibid.
[34] Ibid., "Infant Mortality," 634.
[35] Ibid.
[36] Hill, "Infant Mortality," 634–35.
[37] Davin, "Imperialism and Motherhood," 30.

fats.[38] Other food substitutes, such as bread soaked in water or milk, were also reported as being used by MOHs and health visitors, alongside foods eaten by the rest of the family and given to babies as soon as possible.[39]

Following from improper feeding, Hill also attributed high IMRs to the negligent, inexperienced, and ignorant mothers. Home conditions, such as cleanliness, dampness, drafts, and stuffy rooms all related to increased bronchitis and pneumonia rates among infants, illnesses that Hill believed were entirely preventable if the mother properly managed her home and children.[40] Hill attributed part of maternal ignorance, ironically enough, to the compulsory attendance of schools, which resulted in young girls being taken away from the home where they would have gained firsthand knowledge on the nursing of family. Instead, the daughter was in school and her mother had no assistance in the household with the nursing of children and all other duties. Hill proposed educational reform, with classes on motherhood mandatory for all elder girls in primary education.[41] Certainly, Hill was not alone in this recommendation.

At the turn of the century, Hill increasingly included calls from his MOHs to address the national concerns associated with high IMRs experienced within their districts. In 1903, the MOH from Stockton RD, J. W. Blandford, stated that the decreasing birthrate, paired with the increase in artificial feeding were the leading causes of physical degeneration among the population of his district.[42] The following year, Robert Stobo, MOH for Sunderland RD, noted a lack of consideration given to the social and economic conditions that influenced IMRs, which in turn, threatened the "future greatness of [the] nation."[43] Similar to the concerns raised by contributors to *Public Health* during the same period, these appeals to imperial security were presented by Hill as motivation for concerned MOHs within his county. Furthermore, Hill also featured the apprehensions held by select MOHs in County Durham regarding the moral standings within

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[38] As stated in Chapter 1, this was in part due to mothers watering down condensed milks made from skimmed milks to stretch the usage out of a single can.

[39] Northumberland County Council and John William Hembrough. *Summary of the Annual Reports of the Medical Officers of Health, Together with a Report on the Vital Statistics and Sanitary Conditions of the Administrative County, for the Year 1895* (1896), 11, from NRO/3897/1, Northumberland Archives.

[40] Hill, "Infant Mortality," 637.

[41] Ibid., 637.

[42] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, Eustace Hill M. B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health and Other Records for the Year of 1903* (1904), 147, from CC/H7, Durham County Records Office.

[43] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1904*, (1905), 122, from CC/H8, Durham County Records Office.

certain districts. In 1906, Andrew Smith, MOH for Whickham UD proclaimed that the chief cause for high IMRs within his district was a "lowered moral tone as to parental responsibility," primarily evident in the improper feeding of infants.[44] Coupled with the sanitary concerns already addressed by some MOHs, Smith declared the need for an "educational crusade" which enlisted the help of medical missionaries, Christian missionaries, and most importantly, lady nurse missionaries.[45]

After 1905, Hill relied on select MOHs and their reports to gauge the usefulness of the health visitor, and singled out dissenting voices within the medical community to further promote his approach to combatting high IMRs within County Durham. The most prominent opposition to health visitors presented by Hill was the MOH from Sedgefield RD, Frederick Hunton. Hunton had been a staunch supporter of educational measures to curb IMRs in his district, and while he recognised that pamphlets handed out by the registrar were predominantly ignored, he did not support the appointment of a health visitor within his district who provided in-home advice and instruction to new and nursing mothers. Although he encouraged his council to support educational measures for mothers along with other assistance measures, he also stated "I think it was time a warning note was struck, and that we be not too concerned for the survival of the unfit."[46] Hunton claimed that prematurity and congenital defects brought about by the poor sociological conditions of the parents contributed to "the production of weaklings," resulting in the high IMRs present in Sedgefield.[47] As such, a health visitor could do little to prevent or improve these poor health outcomes for infants within the district. Instead, Hunton argued, mothers who sought out information on their own should be provided assistance at designated centres where district nurses provided assistance.[48]

The introduction of health visitors into the homes of these women, Hunton reported, created resentment towards medical professionals and further dissuaded mothers from seeking out

[44] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1906*, (1907), 69, from CC/H8, Durham County Records Office.
[45] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1906* (1907), 69.
[46] Ibid., 115.
[47] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1907* (1908), 107.
[48] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1906*, (1907), viii-ix., from CC/H9, Durham County Records Office.

medical knowledge for the betterment of their children.[49] Responding to Hunton's claims, however, Hill stated:

> Dr. Hutton's views are, I am glad to say, not those usually held by the medical officers of health in this county or in the country generally, and his opinion that the people would resent a visit from an official lady health visitor has been disproved in every district in which such officials have been appointed.[50]

Hunton's methods of providing information for dedicated mothers, which Hill reported, ran parallel to eugenic approaches to infant welfare. While eugenic-supporting MOHs were rare, they were at times a vocal minority within the medical community.[51] Hill further promoted Hunton's eugenic leanings when he quoted Hunton's thoughts that a contributing factor to high IMRs in Sedgefield and County Durham was a result of "the indifference of the community in general to the science of Eugenics."[52] Yet, Hunton's health approaches within his district were not as tied to eugenic ideals as Hill made it appear. Hunton made routine and passionate calls to his council to improve local sanitary infrastructure.

Environmentalist approaches to health improvements and preventive medicine were the foundations for the first MOHs in Britain and continued to remain the primary influences of MOHs into the twentieth century. Environmentalist MOHs posed a direct challenge to eugenicists who claimed that high levels of death and disease brought about by poverty and ignorance were inherited, and that the sanitary reforms encouraged by MOHs were not only "merely futile, but actually counterproductive."[53] By protecting infants (and other members of the general population) that avoided "natural" diseases caused by unsanitary surroundings, public health officials were encouraging the propagation of the unfit and the degeneration of the nation. It was this divide between eugenicists and environmentalists that Hill emphasised when he reported on Hunton's disdain for health visitors, and while Hunton encouraged some form of "survival of the fittest," when reporting on infant health, elsewhere he fully supported environmentalist reforms to better the overall health of his district.

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[49] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1907*, (1908), viii-ix, from CC/H9, Durham County Records Office.

[50] Ibid., ix.

[51] Szreter, *Fertility, Class, and Gender in Britain*, 240–41. The MOHs Sir Charles Cameron from Dublin, and A. W. Martin were vocal proponents of eugenic ideals on a national scale.

[52] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report 1907,* 107.

[53] Peter Thorsheim, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800*. (Athens, Ohio: Ohio University Press, 2006), 73.

The same year he decried the usefulness of health visitors, Hunton also lamented his council's reluctance to pave over dirt roads, which he considered to be a major contributing factor to high death rates during hot summers. Describing these roads, Hunton claimed that the "residents in these localities cannot escape from the dust which blows in upon them like a stinking Sahara in summer, and engulfs them in a veritable slough of despond in winter."[54] Without entirely committing to either practice, Hunton incorporated eugenicist and environmental approaches into his practice as a MOH. Hunton simultaneously believed that the environment of working people could be improved to encourage better health outcomes, while maintaining that only educating mothers who sought out information on child rearing practices provided the nation with a stronger generation of working-class children.

While using Hunton's opposition to promote the use of health visitors, Hill also featured MOHs that reported favourably on the visitors within their own district, or MOHs who continued to request the employment of such women to their local council. By the early twentieth century, many MOHs in Durham reported on the benefits of employing of health visitors. Pamphlets and leaflets remained in use, but increasingly MOHs noticed that written materials were unread and lectures unattended. The MOH from West Hartlepool, Fred H. Morrison, called for the employment of a health visitor in his borough in 1901, citing that the pamphlets handed out were usually ignored, resulting in the continued "deplorable loss of life is due to ignorance and carelessness on the part of mothers in the management and feeding of infants."[55] The next year, Morrison further explained that the health visitors were vital for spreading education and proper care methods to parents.[56] James Lawrence, the MOH from the county borough of Darlington explained that there had been little benefit from the distributed literature and health lectures.[57] A few years later, in 1904, Lawrence claimed that the appointing of a health visitor addressed the sanitary conditions within the home and also the poor feeding practices of parents within the borough.[58] Other MOHs attributed the declining IMRs in their districts to a combination of

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[54] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report 1906,* 118–19.
[55] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, Eustace Hill M. B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health and Other Records for the Year of 1901* (1902), 22–23, from CC/H7, Durham County Records Office.
[56] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, Eustace Hill M. B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health and Other Records for the Year of 1902* (1903), 24–25, from CC/H7, Durham County Records Office.
[57] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1901,* 1.
[58] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1904,* 1.

educational initiatives. In 1906, Thomas Horne of Stockton singled out the work of the health visitor in tandem with the information pamphlets distributed by the registrar as the reasons for the declining IMR in his district.[59]

The part of the health visitor, however, was not just to instruct mothers on the proper feeding on infants, despite the repeated claims by MOHs that improper feeding was the root cause of high IMRs. Providing instructions to mothers on the feeding of infants constituted only one point on a nine-point list of the duties of a health visitor in County Durham. Other areas of concern for the home visitor were: the identification and removal of bad smells, the opening of windows, ensuring that rooms are not overcrowded (or occupied by opposite sex individuals who were not children or married), encouraging the cleanliness of out-houses, cellars, and the yard of the home, reporting instances of infant or child neglect, and the encouraging of medical advice should it be needed.[60] These items further highlighted an adherence to miasmatic theories.

By 1909, Hill was convinced that the health visitors had played an important role in their districts, and contributed to the county IMR of 124 for that year.

> While there is no doubt that the climatic conditions during 1909 were generally favourable to infant life, and were partly responsible for the low infant mortality-rate throughout the country, there has been for some years past evidence of a satisfactory decline in our infant death-rate, owing no doubt partly to improved sanitary circumstances but also to no small extent to the recognition by the working-class population of the importance of domestic cleanliness in its widest sense. This has been brought about partly by education in our elementary schools, partly by the public attention given to the matter for some years past and, where they have been employed, by the work of Lady Health Visitors.[61]

During the first decade of the twentieth century, MOHs in Durham gradually relied more on health visitors, often claiming that the reduced IMRs in their counties were due to the hard work of these women. Yet the employment of these women was sporadic, dependent upon the approval of local councils along with the support of their county or district MOH. Some MOHs favoured pamphleteering and lectures as the primary means of education, whereas others were unable to convince their local council of the importance of these trained women. Located in a cluster of small coal mining districts, Spennymoor experienced some of the highest IMRs in the county during the early-twentieth century. The MOH for Spennymoor, W. Mussellwhite appealed to his

[59] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1906,* 10.
[60] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1902,* Appendix: 1-2.
[61] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1909,* 8.

local council to hire a health visitor. In 1906 he reported that one third of all infant deaths in his district were the result of diarrhoeal diseases, and urged the appointment of a sanitary inspector "as the best means of overcoming the ignorance and carelessness of the mothers."[62]

The next year, Mussellwhite reported that half of the infant deaths in his district were preventable, again imploring the council to provide a health visitor for his district:

> I am sorry I cannot get the Council to give the amount of attention to it which in my opinion the matter deserves. The Council certainly did consider the matter of appointing a Lady Health Inspector, but rejected it without giving any definite reasons for doing so unless it were on the ground of expense. Seeing that the Shildon District Council offered to share the expense, the experiment would not have cost much (about £40 per annum) less than the wages of one scavenger.[63]

Shildon hired a health inspector in 1908, and in 1910 Mussellwhite used the available statistics from Shildon's experiences to again lobby his council. From 1898 to 1907, Spennymoor experienced an average IMR of 188, whereas Shildon recorded an IMR of 181. However, in 1908, Shildon saw a dramatic decrease in infant deaths, registering 101 deaths per 1,000 births compared to Spennymoor's 169. Shildon's downward trend continued for the next year, when they recorded an IMR of 96, against Spennymoor's 173. Responding to these figures in his annual report, Mussellwhite lamented that had his own district acted as Shildon, 52 infants might have lived in the year 1909.[64] Before ending his report, Mussellwhite declared: "Given another hot dry summer there is little doubt that we shall be in our old inevitable position."[65] He would not have to wait long to be proven correct.

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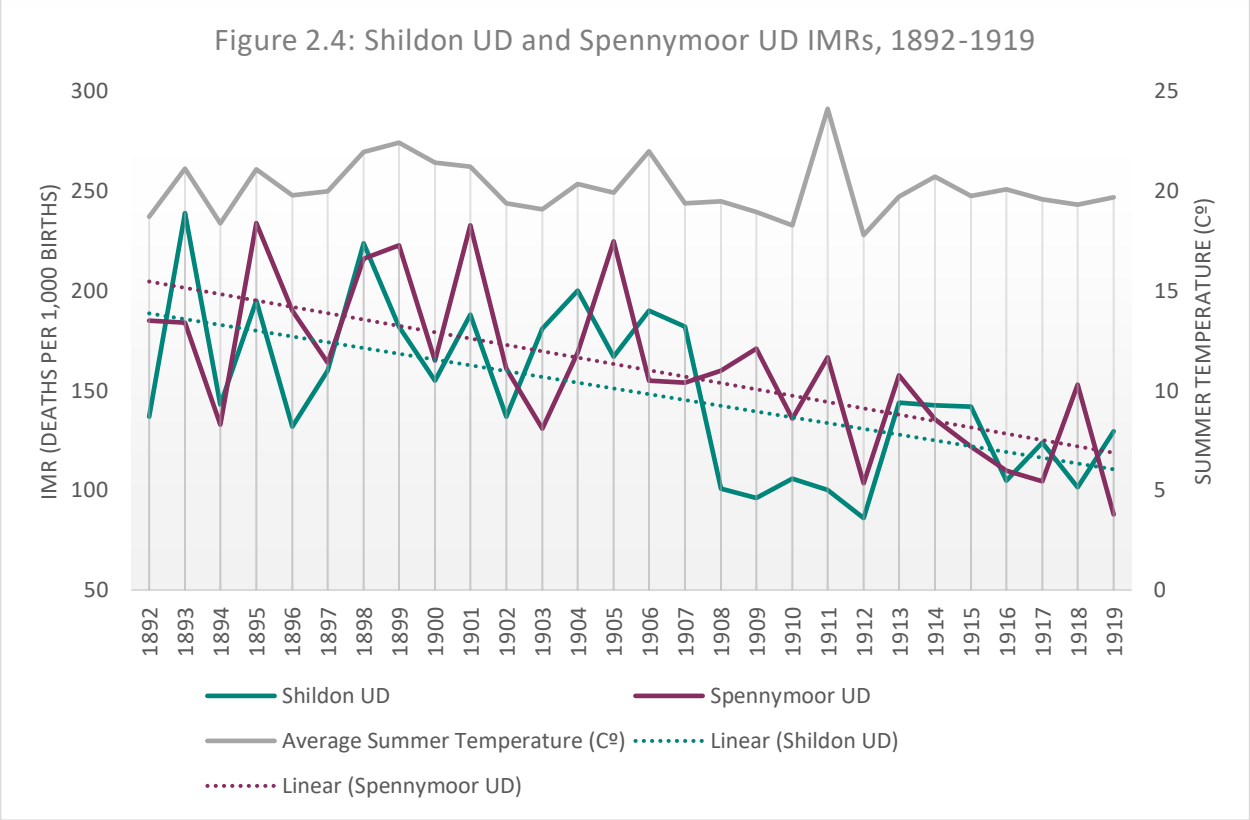
[62] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1906,* 57.
[63] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1907,* 60.
[64] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, Eustace Hill M. B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health and Other Records for the Year of 1910* (1911), 11, from CC/H10, Durham County Records Office.
[65] Ibid.

In 1911, the average temperature during the third quarter months in County Durham rose to 24.5 ºC, the highest it had been in over 20 years. As predicted by Mussellwhite, Spennymoor experienced a higher IMR, recording a yearly total of 166 infant deaths per thousand births, compared to 136 the year before. Shildon UD, however, was able to counter the high temperatures of the summer, and saw a decrease in infant death rates from 106 in 1910, to 100 in 1911 (see Figure 2.4), indicating that Shildon was able to pass the sanitary test.[66] Following the employment of a health visitor in Shildon, IMRs immediately declined and remained low until the summer of 1913. In July of 1913 Shildon was without a health visitor, and remained without one during the summer and into the fall, further indicating that the health visitor was a vital component in Shildon's reduction of diarrhoea related infant deaths.[67] Without a health visitor, the IMRs in Shildon increased to the same levels of similar urban districts that were without health visitors, such as Spennymoor, and were blamed on high diarrhoea rates caused by increased temperatures in 1913 (Figure 2.4).[68]



[66] Sources for maps and graphs are available in Appendix D.

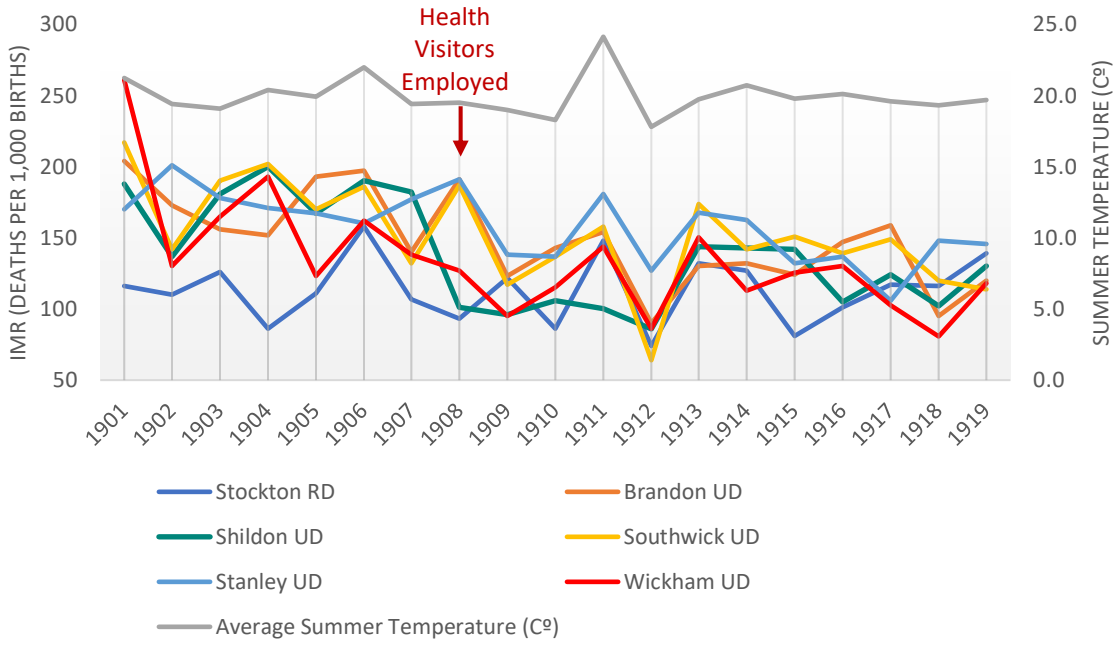
[67] Shildon Urban District Council and S. Fielden, *Report of the Medical Officer of Health to Shildon Urban District Council for the Year Ending Dec. 31st, 1913* (1914), 9-10, from the Wellcome Library. https://wellcomelibrary.org/item/b30084143.

[68] Ibid. Sources for maps and graphs are available in Appendix D.

Other districts that employed health visitors did not have the same experience as Shildon in 1911. Beginning in 1908, six districts (including Shildon) adopted the use of health visitors and district nurses, along with the Notification of Births Act.[69] Stockton RD was the only rural district included in the group, the other districts (Brandon and Byshottles, Southwick, Shildon, Southwick, Stanley, and Wickham) were all urban districts. All of the districts had effective health visitors experienced increased IMRs during 1911 (Figure 2.5).[70] While these districts experienced an overall downward trend in IMRs (Stockton being a noted exception), other districts that did not employ health visitors such as Spennymoor UD and Sedgefield RD also recorded a decline despite the absence of health visitors working in the districts (Figure 2.6).[71]

Over half of the urban districts within County Durham experienced IMRs that exceeded 200 during the third quarter of 1911, and nine out of the 14 rural districts experienced similar

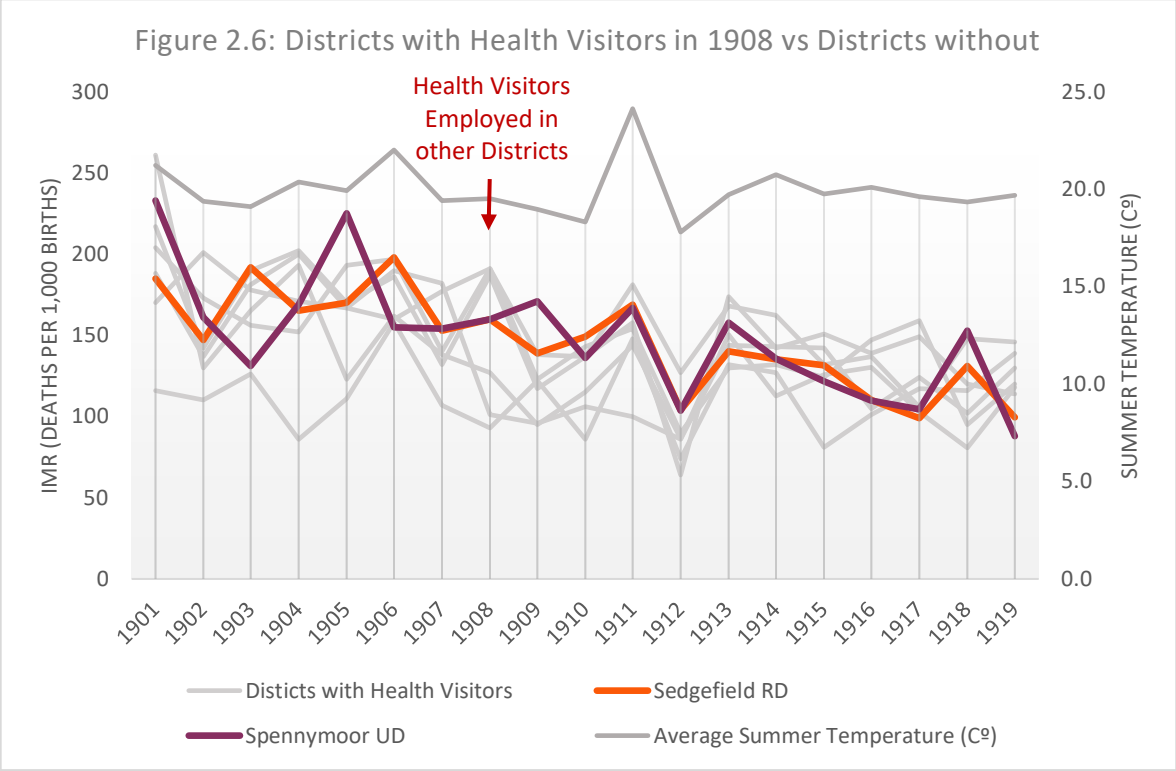
Figure 2.5: IMRs of Districts with Health Visitors in 1908



[69] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, Eustace Hill M. B., B.Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health and Other Records for the Year of 1908* (1909), ix-x., from CC/H9, Durham County Records Office.

[70] Sources for maps and graphs are available in Appendix D.

[71] Sources for maps and graphs are available in Appendix D.



numbers. The district of Hetton UD experienced an IMR of 440 during the third quarter and a yearly average of 208. Leadgate UD similarly experienced high IMRs during the year, with a third quarter IMR of 327, and a yearly average of 224 (the highest in the county for that year).[72] Three districts within County Durham experienced IMRs that exceeded 200, and 36 districts reported higher IMRs in 1911 than in 1910.[73] Similar to the experience in London, districts that housed working- and poorer-class persons still experienced higher IMRs during the warm summer, however, the districts in London that experienced the highest IMRs were still significantly lower than those in County Durham.

Shoreditch had the highest IMR in London for 1911, at 170 deaths per 1,000 births. Only four other districts in London recorded IMRs greater than 150, whereas out of the 48 districts in County Durham, 28 experienced IMRs higher than 150. The MOH for Shoreditch, Dr. Bryett, stated that within this district overcrowding was prevalent, and that up to three-quarters of the

[72] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1911* (1912), 4, from CC/H10, Durham County Records Office.

[73] Leadgate UD, Hetton US, and Sunderland RD all experienced IMRs over 200. Not included in these sanitary tests were the County Boroughs of Sunderland, South Shields, Gateshead, and West Hartlepool, as IMRs before 1911 were not available for these districts.

population lived in cramped conditions.[74] Shoreditch employed two health visitors, who were responsible for providing education to mothers as a means of combating infant deaths. However, it was becoming increasingly apparent that the positive influence of a health visitor was only realised if basic sanitary measures within a district were first met. Miss Charlesworth, one of the health visitors for Shoreditch exclaimed in 1911 that while she still believed there was a benefit from repeat visits and the work of the health visitor, it was increasingly obvious that poor living conditions brought about by unimproved sanitation and regional poverty—"often not the fault of the individual"—were the root causes of continued infant deaths within the district.[75] The focus on educating the mother which had been prevalent throughout the early twentieth century, was increasingly questioned by health officials across the country.

Elsewhere in the county, a similar trend became apparent. Health visitors in Derbyshire routinely targeted their visits to new mothers, focusing on infants and mothers who were deemed high-risk. High-risk cases included the wives of local miners.[76] Similar to the conditions faced by wives and mothers in County Durham, Derbyshire health visitors aimed to assist infants and mothers in mining areas and counteracted the increase in deaths rates by encouraging persistent breastfeeding, and distributed information on safe methods of artificial feeding and techniques for acquiring pure milk or safe dried milk.[77] In Derbyshire, health visitors relied on an effective system of notifications alerting them to at-risk births that required their attention, but these visits would not have been as successful if the important ground work of improving local sanitation had not first been established. The health visitors' success in Derbyshire was dependent on other improved conditions, notably the improved milk supply and local sanitary conditions.[78]

Hill's county reports for the year following 1911 did not discuss IMRs in great detail. Instead, Hill provided the basic yearly totals for IMRs and tables that listed the prevalent causes of infant deaths, but did not include summaries from district MOHs discussing infant health. In 1913 he stated:

> The gross overcrowding which exists in almost all the populous districts of the county is undoubtedly most prejudicial to health and especially to infant welfare,

[74] Mooney, 169.
[75] Mooney, 172.
[76] Alice Reid "Health Visitors and 'Enlightened Motherhood'," 202.
[77] Ibid., 209.
[78] Ibid.

> and many sanitary authorities have not, so far, fully realised their responsibilities in this important matter.[79]

He made no other reference to the causes of high IMRs in his county.

The employment of health visitors in some districts improved IMRs, but this success was dependent upon an effective notification system, ease in accessing mothers and newborns, and pre-existing sanitary conditions to minimise IMRs during warm and dry summers. These conditions were met in areas of London, Derbyshire, and for some time in Shildon UD, but for the majority of County Durham, Hill's reliance and expectations placed upon health visitors was misplaced. Hill failed to convey how domestic factors outside of the mother's control, like available housing in colliery villages, significantly contributed to high IMRs in County Durham.

Hill's reports to the county council were shaped by contemporary views in infant health approaches, and did not reflect the dynamic approaches or opinions held by individual MOHs in County Durham during the turn of the century and first decade of the twentieth century. While Hill included the objections to health visitors raised by Hunton, he did not include other MOHs who held differing perspectives on the causes of IMRs. Similarly, Hill made no mention of MOHs that did not elect to directly address IMRs within their district. Rather, Hill shifted his focus on MOHs and summarised IMRs within the county depending on the popular trends of the time. In the 1890s his focus was on the climatic conditions prevalent during outbreaks of diarrhoea, and during the first decade of the twentieth century he shifted attention to the ignorance of working-class mothers, despite being aware of their domestic hardships and poor local sanitation.

[79] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1913*, (1914), 3, from CC/H11, Durham County Records Office.

CHAPTER 3

The on-the-ground experience of MOHs in County Durham attempting to improve infant health initiatives within their given districts varied greatly from the national discussions of educational reforms presented in *Public Health*, and the vocal and encouraging support for health visitors reflected in Hill's annual reports for the same period. Coal mining districts that contained an array of colliery sites along with small villages and towns to support coalminers and their families were notoriously unsanitary places in County Durham during the late-nineteenth and early-twentieth centuries.[1] As such, MOHs in these districts were presented with a host of sanitary concerns that jeopardised the health of district residents of all ages. Infant health was one facet of public health that MOHs presided over, and in County Durham the level of importance prescribed to infant welfare initiatives differed from district to district, along with the approaches adopted by MOHs to address high IMRs.

This case study of select districts in County Durham focuses on three districts mentioned in Hill's report on infant mortality in 1905, along with two other district MOHs who featured heavily in his annual reports. In his 1905 report, Hill indicated that overcrowding in rural coal mining districts, particularly in Lanchester, Easington, and Chester-le-Street, was a significant factor that contributed to high IMRs in County Durham. Hill attributed this overcrowding in County Durham to the accommodations provided by colliery owners to colliery workers and their families. The first section of this case study will examine how the MOHs for Lanchester, Easington, and Chester-le-Street addressed public health concerns stemming from the living conditions of the district residents, and how these concerns shaped their attitudes towards infant health. Significantly, this examination finds that these MOHs rarely mentioned problems that arose from overcrowding, and instead focused on improving local sanitation measures over any other public health initiative, including infant health initiatives.

The only MOH from these three coal mining districts who spoke (comparatively) at length on infant health was the MOH from Chester-le-Street, but he did not attribute high IMRs to predominantly overcrowded conditions. Rather, his focus was on an area Hill had passed over in his report: the use of abortifacients among working-class women that contributed to heightened premature birth rates, and allegedly weakened the mother's ability to carry any future pregnancies to term. The MOH from Sedgefield, whom Hill had previously called attention to in his annual

[1] Buchanan, 170.

reports due to his eugenic leanings and sympathies, likewise insisted there was a significant danger associated with the use of abortive substances among working-class women in County Durham.

The final section of this case study examines MOHs from Sedgefield and Spennymoor. Both of these MOHs featured in Hill's reports, although for opposite reasons. Hunton, from Sedgefield, was a vocal proponent against the use of health visitors whereas Mussellwhite from Spennymoor frequently requested the employment of a health visitor. Both of these men had their own convictions regarding infant health and the role of the mother in determining infant health outcomes, and both engaged with the national conversations regarding infant health featured in *Public Health* differently. Hunton refuted the claims made by other MOHs as to the effectiveness of health visitors, whereas Mussellwhite actively engaged with MOHs such as the county MOH who supported mother-based initiatives to improve infant health.

Sanitation was a common goal among all these MOHs, from which MOHs across the county branched out and focused on other areas in public health. Some MOHs, such as Mussellwhite from Spennymoor, engaged with the national conversations facilitated by the knowledge network created by *Public Health* and further fostered by the county MOH. Other MOHs, notably Hunton, disagreed with the methods supported by MOHs at the county and national level, insisting that there were other more pressing factors contributing to high IMRs. Between these two opposing views, other MOHs continued their work, focusing on sanitation needs and occasionally referencing infant mortality and the measures they supported in an attempt to improve infant health outcomes. Nonetheless, the approaches to infant health within the county differed greatly from MOH to MOH, and while these differences continued until the outbreak of the First World War, each of the MOHs included in this case study was concerned with improving the health outcomes of their district with a focus on improved sanitation measures.

Over a quarter of all collieries in Country Durham at the time of Hill's 1905 report on infant mortality were located within the districts of Lanchester, Chester-le-Street, and Easington (Figure 3.1).[2] These three coal mining districts were large rural districts, and while they were singled out by Hill for high rates of overcrowding, their IMRs were not as high as neighbouring

[2] These three districts contained 146 of the 505 collieries (or 28.9% of the collieries) in operation in 1905. Sources for maps and graphs are available in Appendix D.

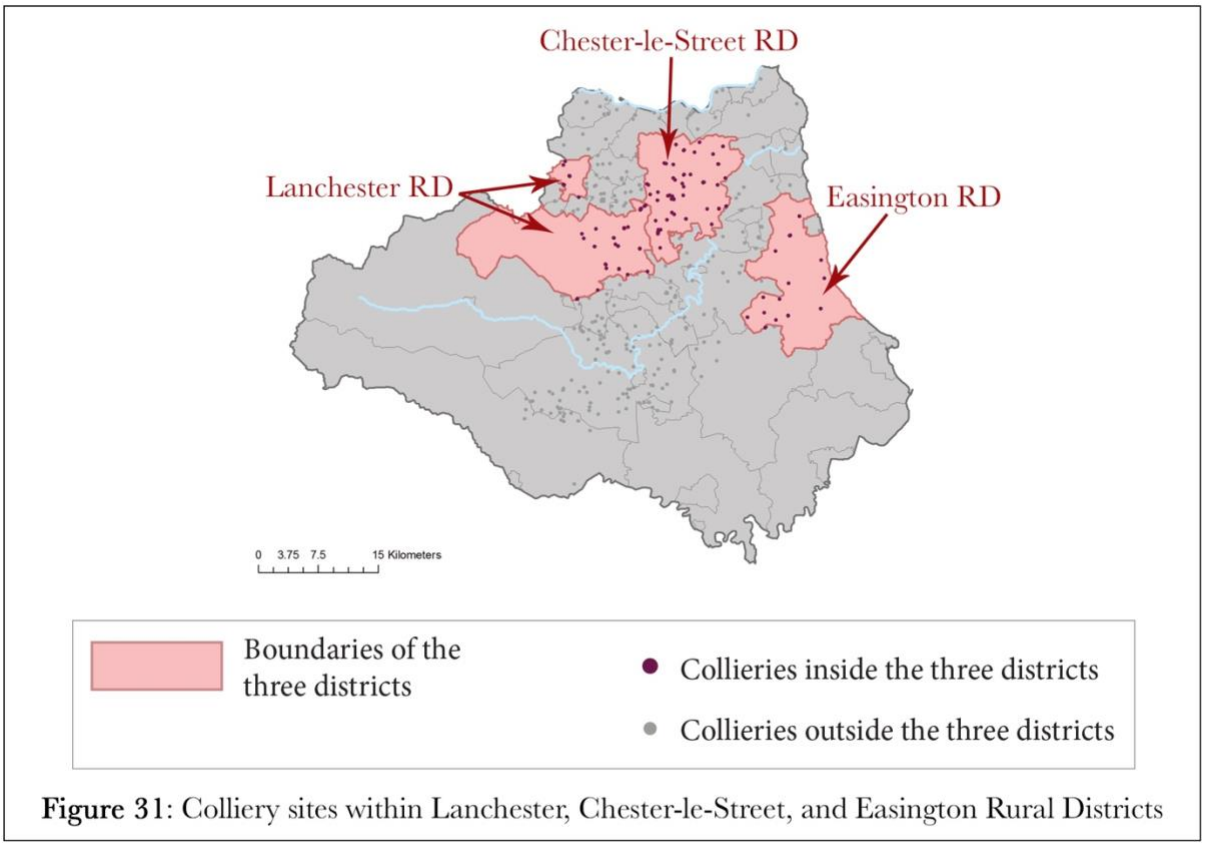


Figure 31: Colliery sites within Lanchester, Chester-le-Street, and Easington Rural Districts

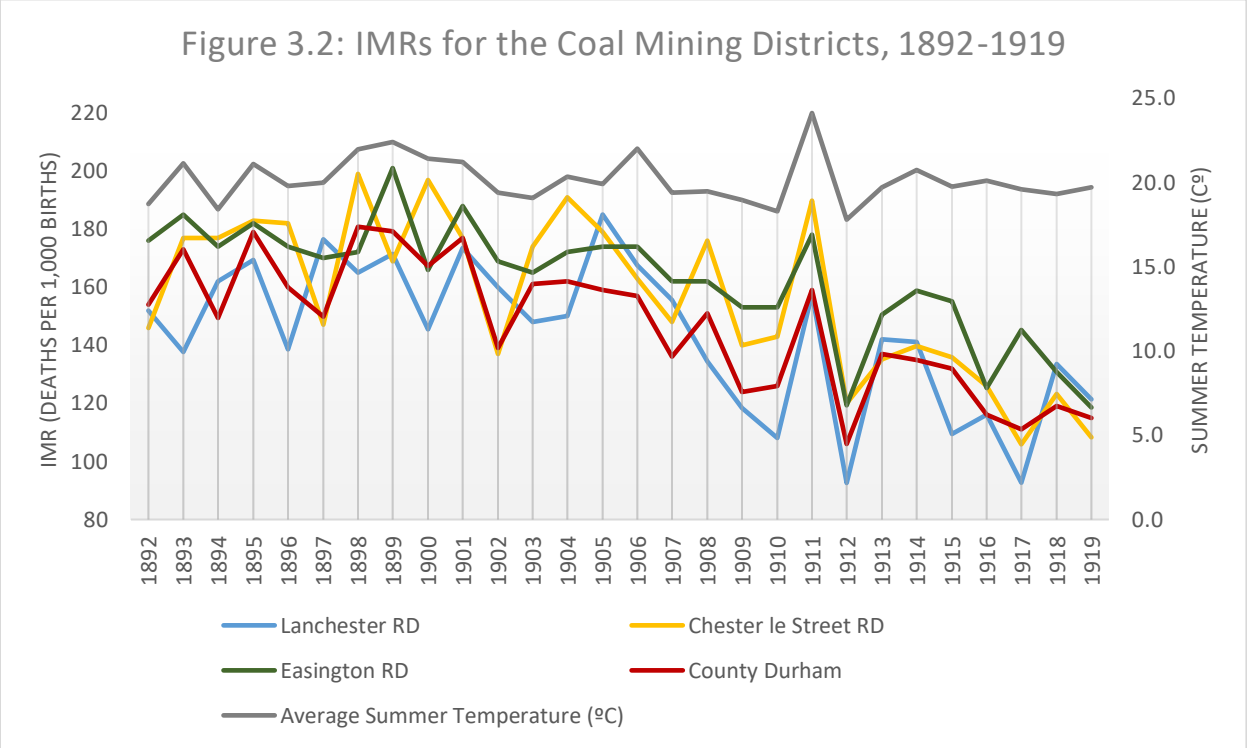
urban districts. Compared to the county average, the IMRs of Chester-le-Street and Easington were regularly higher than average, with Lanchester occasionally recording a lower IMR than the county average (Figure 3.2).[3] Local environments influenced IMRs, as evident during 1911 when summer temperatures resulted in increased IMRs across the county. Yet, these three districts were not the worst performing districts in the county. Chester-le-Street failed the sanitary test for this year, but the districts of Easington and Lanchester indicated important sanitary changes were underway within the districts (Figure 3.2).

Between 1905 and 1910, Easington averaged an IMR of 163, and in 1911 recorded an IMR of 178 deaths per 1,000 births, or a nine per cent increase from the average. Significantly, while the direct comparison revealed a worrying increase in IMRs, an IMR in the 170 range was not entirely new to Easington. Only five years earlier, when summer temperatures hovered near 20° C, Easington recorded an IMR of 174. During the warmest summer in over 20 years, Easington experienced an IMR similar to those recorded during the relatively cooler summer just five years earlier. Lanchester performed even better than Easington, although the district still

[3] Sources for maps and graphs are available in Appendix D.

experienced a noticeable increase between the 1910 and 1911 IMRs with the former being a low 108, and the latter a much more pronounced 157.59 deaths per 1,000 births. However, the IMR of 157.59 recorded in 1911 was significantly lower than the IMR from five years earlier when 167 died per 1,000 infants born. Between these two coal mining districts significant changes were underway that addressed higher IMRs, and although these districts did not entirely mitigate the significance of heightened temperatures on IMRs by 1911, the IMRs remained lower than those recorded in the years earlier when temperatures had a smaller influence over IMRs.

Unlike its coal mining counterparts, Chester-le-Street was not as successful at addressing temperature variances in IMRs. Whereas Easington and Lanchester were able to reduce their 1911 IMRs to levels previously experienced in cooler summers, Chester-le-Street recorded an IMR in 1911 that was higher than the IMR five years earlier.[4] Indeed, Chester-le-Street was the worst performing of the coal mining districts in 1905, yet it was not the worst performing district in the county. Its 20 per cent increase in IMRs compared to the 1905-1910 averages placed Chester-le-Street 15th out of 44 when comparing IMR increases in the county, and while Chester-le-Street



[4] In 1911 Chester-le-Street recorded an IMR of 189.89, compared to the 1905-1910 average IMR of 158.17. The highest IMR previously experienced by Chester-le-Street was in 1904 when it recorded an IMR of 191. While this IMR in 1904 was similar to the IMR experienced in 1911, it was a significant outlier during the first decade of the twentieth century for Chester-le-Street.

struggled to improve its IMRs before 1911, in 1912 it recorded an IMR lower than that of Easington. Between 1912 and 1919, Chester-le-Street experienced an IMR that was close to the county average, and routinely below that of Easington. Ultimately, in each of the coal mining districts, infant mortality was steadily declining through the first two decades of the twentieth century, although the decline was at different rates and was slower than the county and national averages (See Figure 2.2 in Chapter 2).

Due to the size of the district, Lanchester was one of the few districts in County Durham to have multiple MOHs. In the 1890s there were three sub-districts within Lanchester, each of which had an MOH assigned: John Wilson worked in and reported on the Lanchester District, W. T. Bolton in the Medomsley District, and T. Benson in the Eastern District. The number of MOHs in Lanchester changed throughout the period due to new districts being created from Lanchester. While the number of MOHs in Lanchester changed throughout the end of the nineteenth and into the twentieth century, the annual reports from these MOHs were similarly organised and focused primarily on the sanitation of the villages and collieries within the district. One of the only mentions of infant mortality came in 1894, when Benson from the Eastern District noted that infant mortality was "particularly excessive," in that year, with 97 deaths against 567 births in that part of the district, resulting in an IMR of 171.[5] He made no other indication as to what was causing the high IMRs, nor did he reveal whether he was enacting any measures to counter the excessive mortality rate. Compared to the IMR for the entire district for the same year (162), the Eastern District was higher than average, but the county average was skewed due to the comparatively low IMR in the Medomsley District where 31 deaths resulted from 247 births, providing an IMR of 125.5.[6] Furthermore, the Lanchester District exhibited an even higher IMR of 192.8 (129 infant deaths from 669 births), yet Wilson made no mention of the high mortality rate in his report, opting instead to report on the sanitary conditions of the villages and instances of disease outbreaks.[7]

In the same year that Hill stated overcrowding was a serious cause for higher IMRs in coal mining districts like Lanchester, the same sentiment was not found in the annual reports of the

[5] Rural District Council of Lanchester, John Wilson, W. T. Bolton, and T. Benson, *The Annual Reports of the Medical Officers of Health and Inspector of Nuisances for the Year 1894* (1895), 16, from the Wellcome Library. https://wellcomelibrary.org/item/b29719173.

[6] The MOH for Medomsley did not provide an IMR in his report. The IMR was calculated from the birth and death tables provided at the end of his report. Rural District Council of Lanchester, John Wilson, W. T. Bolton, and T. Benson, 14-15.

[7] Ibid., 7-8.

Lanchester MOHs. Only one instance of overcrowding was reported in the combined Lanchester annual report, which came from the Lanchester District by Wilson.[8] Housing in the Western District, comparatively, was in ample supply.[9] Despite Hill making claims that overcrowding in these districts was causing high IMRs, the local MOHs were not reporting instances of overcrowding in their annual reports. Only after the release of the 1911 Census Returns the MOH in Lanchester began addressing housing shortages and levels of overcrowding. In 1914, the sole MOH for Lanchester, T. Buckham, reported on the high percentages of overcrowding, particularly near colliery sites. In the village of Burnhope, 51 per cent of the homes recoded higher occupations than two persons per room, resulting in overcrowding.[10] As a result, Buckham estimated that at least 50 new homes needed to be built in the village, and importantly, these homes needed to have no less than five rooms each.[11] These homes in the village of Burnhope would then provide living spaces for miners employed by one of the nine surrounding collieries.

Yet even with this inclusion of overcrowding and housing shortages, the reports from Buckham shared a striking similarity to those published 20 years earlier by Wilson, Benson, and Bolton. The MOHs in Lanchester focused their attention on ensuring that the villages within the district had sufficient scavenging, fresh water, and appropriate accommodations. The sanitary conditions of villages and parishes trumped any and all conversations regarding infant health and welfare. Similarly, the discussion surrounding disease outbreaks centred on diseases that were experienced predominantly by the work-aged population, and this focus on improving conditions for the working population was not a phenomenon unique to Lanchester. The mining district of Easington RD also focused more heavily on the welfare of the working population and local surroundings, however, the MOH in Easington did more than his counterparts in Lanchester to address infant mortality in his reports, while also maintaining a large focus on improving local sanitation within the district.

The MOH for Easington, James Arthur, was aware of the links between high diarrhoea rates and infant deaths, and attributed these deaths predominantly to the improper feeding of

[8] Rural District Council of Lanchester, John Wilson and W. T. Bolton, *The Annual Reports of the Medical Officers of Health for the Year 1905* (1906), 5, from the Wellcome Library. https://wellcomelibrary.org/item/b29719203.
[9] Ibid., 19.
[10] Rural District Council of Lanchester and T. Buckham, *The Annual Report of the Medical Officer of Health for the Year 1914* (1915), 12, from the Wellcome Library. https://wellcomelibrary.org/item/b29719239.
[11] Ibid., 7.

infants brought about by poverty and ignorance.[12] By the end of the nineteenth century, Arthur believed that the improved sanitation in his district and educational pamphleteering conducted by the council had resulted in lowering instances of diseases linked to poor conditions such as enteric fever (typhoid fever) and diarrhoea, but his primary focus remained on improving the overall sanitation of the district.[13] During the first decade of the twentieth century, Arthur focused on reducing the number of disease outbreaks in the district, and did little to directly confront infant mortality apart from encouraging the council to supply pamphlets to parents registering births. In 1910 he noted that the IMR had declined predominantly because of the council's labours, but he did not include the fact that infant mortality continued to be above the county average, nor that it was declining at a slower rate than other districts.[14] While he associated diarrhoea with infant deaths due to improper feeding, he was more concerned with addressing diseases that affected the general population. In the same year that Easington recorded its lowest IMR, he made no mention of infant health initiatives for the district apart from noting that the council was continuing to supply pamphlets to new parents.[15] Instead, he focused on outbreaks of diphtheria, which were disastrous for a working-class family when the breadwinner was ill.[16] His concern was in curbing disease outbreaks that hampered the working population of the district, especially coal miners, not diseases that were prevalent in the very young and old who could not support the household.

Just as the MOHs in Lanchester had focused on the general sanitation of their districts, Arthur also focused on inspecting the local villages and communities to provide the best living conditions for coal miners and their families. Arthur also indicated that overcrowding occasionally occurred in the district, but made no indication that this was as significant to IMRs as Hill stated.[17] Comparing the population densities of the two districts, Lanchester had a significantly lower

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[12] Rural District Council of Easington and James Arthur, *Report of the Medical Officer of Health for the Year Ended December 31, 1898* (1899), 9, from the Wellcome Library. https://wellcomelibrary.org/item/b2918003.

[13] Rural District Council of Easington and James Arthur, *Report of the Medical Officer of Health for the Year Ended December 31, 1899* (1900), 13, from the Wellcome Library. https://wellcomelibrary.org/item/b29180041.

[14] Rural District Council of Easington and James Arthur, *Report of the Medical Officer of Health for the Year Ended December 31, 1910* (1911), 29, from the Wellcome Library. https://wellcomelibrary.org/item/b29180090.

[15] Rural District Council of Easington and James Arthur, *Report of the Medical Officer of Health for the Year Ended December 31, 1909* (1910), 27-28, from the Wellcome Library. https://wellcomelibrary.org/item/b29180090.

[16] Although predominantly thought of as a childhood disease (in part due to its similarities and association with membranous croup), diphtheria outbreaks did occur among adult populations. Contemporaries noted that diphtheria outbreaks did have the capacity to infect an entire household. See Hardy, *The Epidemic Streets*, 88.

[17] Rural District Council of Easington and James Arthur, *Report of the Medical Officer of Health for the Year Ended December 31, 1913* (1914), 15, from the Wellcome Library. https://wellcomelibrary.org/item/b29180119.

density with 0.63 persons per acre compared to Easington's 1.62 persons per acre in 1911.[18] When considering the dispersal of collieries, however, the inverse was true. Lanchester contained 117 colliery sites compared to the 44 present in Easington, yet it remains difficult to estimate rates of overcrowding with this information, as the collieries in districts like Easington were regularly larger and more heavily machined than the sites more inland.[19]

The reports differed from Lanchester and Easington regarding the state of overcrowding within their districts, yet neither made any indication as to the relation of overcrowded conditions and the direct association Hill had made with higher IMRs. The only MOH in the coal mining districts singled out by Hill who reported on the direct link between the two factors was the MOH from Chester-le-Street, John Taylor. Taylor's report on overcrowding and poor infant health outcomes came almost five years after Hill's initial report, but he also indicated a direct link between colliery activity and infant mortality. The township of Pelton in Chester-le-Street included seven colliery sites within walking proximity to town residents, yet the houses available in Pelton for workers were in need of dire repair (For the Pelton cluster see Figure 3.3).[20] Taylor estimated that over 100 homes were unfit, placing a large strain on the estimated 200 tenants who worked in the nearby collieries, and their families.[21]

In his immediate approaches to curbing infant mortality, Taylor was a proponent of assessing the environmental determinants. His focus on clean homes led him to associate single-roomed homes with higher rates of infant mortality well before Hill's 1905 report. In 1895, Taylor claimed that in Chester-le-Street even the clean homes with "careful mothers" were not removed from the threat of summer diarrhoea. The number of rooms in a home correlated with higher instances of infant death, and Taylor estimated that IMRs were 66% higher in single room homes.[22]

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[18] Density calculated from population and district area provided by *Vision of Britain*. See Appendix D: Maps and Graphs References.

[19] Mike Gill, email correspondence with author, March 27th, 2017.

[20] Sources for maps and graphs are available in Appendix D.

[21] Rural District Council of Chester-le-Street and John Taylor, *Seventeenth Annual Report of the Medical Officer of Health on the Sanitary Condition of the District for the Year 1911* (1912), 43, from the Wellcome Library. https://wellcomelibrary.org/item/b29108123.

[22] Taylor provided no figures for this estimate. Rural District Council of Chester-le-Street and John Taylor, *Annual Report of the Medical Officer of Health for Part of the Year Ended 31st, Dec., 1895* (1896), 7, from the Wellcome Library. https://wellcomelibrary.org/item/b29108032.

Similarly, Taylor did not associate improper feeding with higher instances of infantile diarrhoea, rather, he believed the connection was entirely due to summer temperatures. Because the rates of diarrhoea changed from year to year in association with temperature, and because of his belief in Ballard's theory of diarrhoea disease transmission, Taylor was convinced that there was "no doubt but that the cause [of infant diarrhoea was] an aërial poison generated by a certain temperature, in a polluted soil."[23] The housing conditions in many colliery clusters within the district further exposed infants to this poison, rendering them more susceptible to diarrhoeal diseases and heightened IMRs.

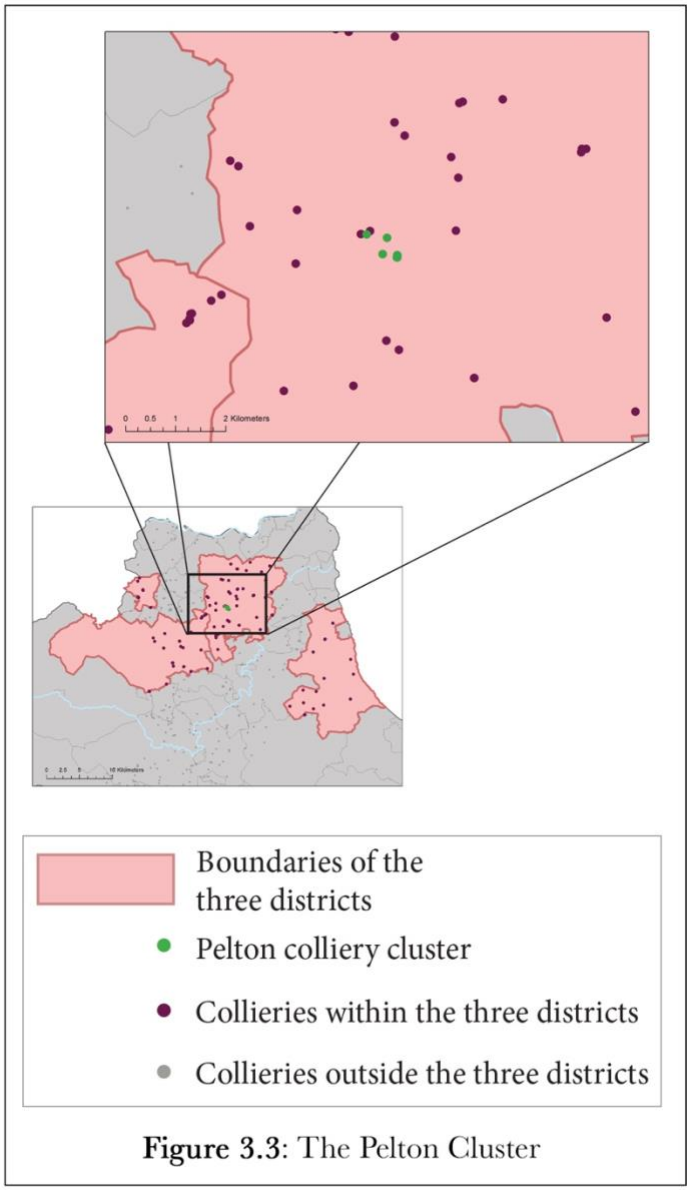

Figure 3.3: The Pelton Cluster

Returning to Pelton, Taylor continued to record IMRs within the township and the housing conditions for coal mining families. Between 1905 and 1911, the district of Chester-le-Street experienced an average IMR of 163, yet over the same period, the average IMR for the township of Pelton was 200.7 deaths per 1,000 births.[24] Taylor attributed this high death rate to the housing available in Pelton, describing the poor conditions associated with many of homes available to working-class families.

[23] Rural District Council of Chester-le-Street and John Taylor, *Second Annual Report of the Medical Officer of Health of the Sanitary Condition of the District with Tabular Returns of Sickness and Mortality during the Year 1896*, (1897), 13, from the Wellcome Library. https://wellcomelibrary.org/item/b29108044.

[24] Rural District Council of Chester-le-Street and John Taylor, *Seventeenth Annual Report*, 44.

> In this parish there is quite a large number of back-to-back houses of two rooms only, though in most instances the upper room has been divided into two for the better separation of the sexes. These upstairs rooms are low, poorly lighted, unheated and really there is as little comfort to be got in these houses as one could imagine. In cases of illness in winter time, the kitchen is the only room in which a patient can be placed. The small kitchen is thus the living room, washhouse and sick room. This is not a condition of affairs to produce healthy or contented people, nor yet to improve the morals of the young.[25]

Taylor believed that improving the homes for the workers in Pelton, and those across the district would have an immediate positive affect on the IMR, but he also believed that there were other factors that influenced infant health that needed addressing in order to provide the best chances for at-risk infants.

While MOHs like Hill turned their gaze to the neglectful mother and her inability to properly care for her newborn, Taylor focused more on antenatal contributors to poor infant health outcomes. Mothers were still to blame for increased IMRs, according to Taylor, and like other MOHs, he blamed a moral failing among women, but the type of this failing differed from the neglect and ignorance described by Hill. Among working-class wives within Chester-le-Street, Taylor noted that there was a growing desire to "lessen child-production" in the marriage. Taylor continued:

> Look at the numerous advertisements in all sorts of newspapers, of remedies to correct, as is said, 'all irregularities' in females, and without doubt the use of the infanticidal poisons is on the increase, and that increase is going on amongst the most fertile of our population. The use of these remedies injures many unborn children, and accomplishes what they are intended to do, abortion, death to the infant, and permanent injury to the mother, rendering her unable to carry on the most important function nature intended her to do, viz., the reproduction of her species.[26]

The infant deaths that resulted from these advertised remedies were strongly associated with the high rate of premature births that resulted in death.[27] He made no mention of how the mother's health may have contributed to her difficulties in carrying a pregnancy to term.[28]

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[25] Ibid., 51.

[26] Rural District Council of Chester-le-Street and John Taylor, *Thirteenth Annual Report of the Medical Officer of Health on the Health and Sanitary Condition of the District for the Year 1907* (1908), 8, from the Wellcome Library. https://wellcomelibrary.org/item/b29108093.

[27] Ibid.

[28] Ibid.

Abortion practices were a regular part of working-class life for women in Britain during the nineteenth and early-twentieth centuries, despite Britain having the harshest abortion laws in Europe during the same period.[29] The demands of motherhood and working-class family life coupled with the economic and physical strains of pregnancy led many women to seek a means of controlling their fertility, and for women in counties that neighboured County Durham, local knowledge networks headed by women healers and midwives provided these services for women that were not endorsed by MOHs. Francesca Moore has studied one such network in Lancaster, noting that only when the most prominent midwife (or according to MOHs, a "handywoman") passed away did MOHs notice that women in the area were more accepting of the medical knowledge being supplied by MOHs.[30] MOHs reported on ignorant mothers who resented health authorities like health visitors. However, Hill made no mention of such organised opposition among women in his reports or summaries, despite there being indications of women seeking knowledge from traditional sources within the county's districts.

The experience of working-class women in County Durham was also similar to the description provided by Simon Szreter of women, who, unlike those who were able to effectively reduce fertility by spacing births, were more likely to use abortive substances. Birth spacing techniques were more regularly employed by industrial families that included both paternal and maternal wage earners, such as textile workers in Lancashire and West Yorkshire, or shopkeepers.[31] Comparatively, abortion was used during the early twentieth century by unemployed and relatively isolated working-class women, "where regulation of family size was not recognised by couples as a common goal."[32] Women in the Durham Coalfield living in small villages near colliery sites were already isolated from major centres. Coupled with their lack of employment and the work associated with managing a household that operated in shifts, within poorly constructed homes that failed to meet sanitary standards. further isolated working-class women in County Durham.

The use of advertised substances to induce a miscarriage was one viable route for women seeking to manage their family size, but there were other more local solutions available to women. Birth control measures varied across the country, and different methods were determined by local

[29] Francesca Moore, "'Go and See Nell; She'll Put You Right': The Wisewoman and Working-Class Health Care in Early Twentieth-Century Lancashire," *Social History of Medicine* 26, no. 4 (November 1, 2013): 705
[30] Moore, 711.
[31] Szreter, *Fertility, Class, and Gender in Britain,* 429-430.
[32] Ibid., 429.

customs, cultures, and socioeconomic standings. Knowledge networks such as the ones present in Lancashire provided one avenue for women seeking information and birth control advice, along with connections to non-orthodox midwives. Other local avenues for women seeking abortions were more dependent on the local economy. For example, in Newcastle-upon-Tyne, the major centre for the white lead industry, lead-based abortifacients were more prominent and available for women. Other techniques included ingesting aloes or lead-based plasters purchased from chemists.[33] While Taylor did not specifically mention the abortifacients used by women in Chester-le-Street, he was adamant that the use of such substances induced both physical and moral failings of the working-class mothers within his district. Taylor was not the only MOH to hold this opinion, nor was he the only one in County Durham to express the dangers associated with medical measures taken by women to terminate a pregnancy.

Frederick Hunton, the MOH from Sedgefield, claimed that the use of health visitors to address infant mortality would not be as effective as believed, due to the prevalence of premature births and injured mothers brought about by the use of abortifacients. Hunton's arguments against health visitors set him at odds with the county MOH, but his approach to addressing infant mortality was similar to that of Taylor in Chester-le-Street, in that he identified a moral failing in mothers as one of the prevailing causes for high IMRs within Sedgefield. While he was vocal about infant health and the role of the mother, Hunton was also largely focused on the general sanitation of Sedgefield, much in the same fashion as other MOHs from coal mining districts. He was outspoken in his reports, aggressively chastising his council for inadequate sanitary measures, while simultaneously commending them for declining to employ a health visitor. Health visitors, Hunton argued, were only effective if they addressed what Hunton considered to lay "very much at the root of infantile mortality, viz., marital vitality."[34] Hunton continued that the press,

> who have done so much good in educating the public on matters of health, would further help in this direction by discontinuing many of the thinly veiled advertisements, which cannot be otherwise regarded that as incitements to abortion.[35]

[33] Szreter, 436.
[34] Council of the County Palatine of Durham and T. Eustace Hill, *Annual Report, 1907*, 115.
[35] Ibid.

Hunton and Taylor both indicated that the use of abortifacients, advertised to working-class women in the press, was a significant factor towards high IMRs that was not being addressed elsewhere.

Working-class women who wrote letters to the Woman's Co-operative Guild were open about their usage of "drugs" in their attempts to terminate pregnancies. For working-class women, the drugs at their disposal came with high risks, and often resulted in serious illnesses or death when misused.[36] Still, many women referenced their own usage of such remedies or the use of such drugs by friends. For many women, pregnancy and child raising were physically and emotionally taxing events that drained family finances. Without access to other means of birth control, working-class women sought out whatever possible solutions they could, regardless of the outcome.

One woman wrote to the guild:

> I confess without shame that when well-meaning friends said: 'you cannot afford another baby; take this drug,' I took their strong concoctions to purge me of the little life that might be mine. They failed, as such things generally do, and the third baby came. Many a time I have sat in daddy's big chair, a baby two and a half years old at my back, one sixteen months and one one month old on my knees, and cried for very weariness and hopelessness.[37]

The letters written by the guild members stand in contrast to the opinions of the MOHs, especially Hunton and Taylor. Working-class women sought drugs to terminate pregnancies to lessen the financial and physical burdens of pregnancy, childbirth, and childrearing within a working-class household. Yet the tone set by Hunton and Taylor's reports did not indicate that these methods were the last resorts of desperate women. Rather, they presented the use of drugs as a method employed by feckless women too negligent, ignorant, and lazy to raise children.

For Hunton, there was little hope for the current generation of mothers who raised their children ignorantly and without heeding the advice of health officials, and who received their mothering advice from local women or media advertisements.[38] As such, he supported educational measures for young girls, hoping that lessons in elementary schools would result in children who were better cared for and managed by the next generation. Regarding current mothers, Hunton

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[36] Gloden Dallas, introduction to *Maternity: Letters from Working Class Women*, ed. Margaret Llewelyn Davies (London: Virago, 1915).

[37] "Stead's Penny Poets," in *Maternity: Letters from Working Class Women*, ed. Margaret Llewelyn Davies (London: Virago, 1915), 45.

[38] Knowledge networks created by older women and women who were midwives before registration was required were valuable resources for women seeking childrearing or medical advice without the scrutiny of the health visitor or MOH. See Moore.

remarked that education had little positive affect, as "the pride of ignorance is so great as to form a barrier, neutralizing the best efforts of those who seek to remedy this evil."[39] Hunton supported the hiring of a district nurse to attend to mothers who sought out information and advice on child rearing, but he was adamant that the mothers in his district would resent any medical person who dictated proper practices within their own homes, remarking that "in their very resentment they would have my sympathy."[40] The people of Sedgefield held a "praiseworthy independence" that would have been interfered with were the council to enact the Notifications of Birth Act or other prevention measures. Consequently, Hunton argued against the use of interventionist approaches to address high IMRs.[41]

Much like other MOHs in the district and the county, Hunton placed the responsibility for the high IMRs on mothers. However, he also commented on the role of the father, and the prevalence of weekend professional football matches:

> Where can you now see the same father who used to lend a hand on a Saturday with the weekly 'tidying up?' Is he not to be found swelling the huge football crowds, alas, not as a player, but merely lookers-on, which every week depleted homes of men who, if the pride of the family was still our national boast, would be not looking on, but actively participating in the game domestic.[42]

Not only were men no longer engaging with household duties, but they also were no longer physically engaged in local sport. By neglecting these two areas, fathers reduced the efficiency of the households, and also reduced their own physical efficiency. Hunton's single mention of the father, however, did not detract from his comments towards the responsibility of the mother for raising healthy and fit children. Hunton believed the neglect inflicted upon the infants of his district was due to deliberate choices taken by mothers, not a lack of knowledge as argued by other MOHs.[43]

As such, Hunton argued that infant mortality could only be remedied if current mothers were provided with the necessary resources for their children to flourish while girls were trained in

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[39] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report of the Medical Officer of Health for the Year Ended December 31, 1903* (1904), 5, from the Wellcome Library. https://wellcomelibrary.org/item/b30209766.

[40] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report of the Medical Officer of Health for the Year Ended December 31, 1908* (1909), 6, from the Wellcome Library. https://wellcomelibrary.org/item/b30076213.

[41] Ibid., 6.

[42] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report 1908*, 5.

[43] Ibid., 4-5.

the proper methods of mothering and running a household. Only the hardiest children of neglectful mothers would survive into adulthood, and by then the newly educated generation of mothers would be properly educated to provide for their families. Hunton's initial approach to curbing IMRs, therefore, centred on providing information to mothers who sought out advice, ensuring that mothers who were already dedicated to improving the health of their children were accommodated, rather than on blanket educational and interventionist measures adopted in other districts and counties. Yet, Hunton's attitudes towards health visitors began to shift after the first decade of the twentieth century as health visitors became associated with improved IMRs in the county and across the country.

By 1913, Hunton was more inclined to believe in the benefits of health visitors, but he was still not a full supporter of having medical women entering the home of new mothers. There was a possibility, Hunton admitted, that the "appointment of a staff of bewitching lady Health Visitors ought (if talk be of any value) to produce great results," but he added that health visitors would merely be filling the "ancient *rôle* of charmer in the cure and prevention of disease," rather than providing a new method of medical care.[44] Hunton, while not fully convinced, was warming to the position of a health visitor. While his attitudes towards health visitors eventually shifted toward a more positive, although still cynical, view, Hunton remained consistent in other areas of his appointment of MOH. Hunton was focused on the overall sanitation of his district, and he was also highly critical of his council; he routinely expressed his exaspration at their apparent inaction to improve local sanitary conditions. In 1902, he warned the council that the improved mortality of the year was in fact due to a cooler summer, and that the council should continue to focus on ensuring an efficient scavenging system without taking temperature-related declines for granted.[45]

One of his more vocal outbursts of displeasure with his council came in 1908 when he decried, under the heading of sanitation, "I am in despair of this subject."[46] To Hunton's mind, his council had done nothing to improve the surroundings of the townships of Ferryhill, Cornforth, and Trimdom, some of which included colliery sites. Writing directly to his council, Hunton declared:

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[44] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report of the Medical Officer of Health for the Year Ended December 31, 1913* (1914), 5, from the Wellcome Library. https://wellcomelibrary.org/item/b30076225.

[45] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report of the Medical Officer of Health for the Year Ended December 31, 1902* (1903), 4 and 10, from the Wellcome Library. https://wellcomelibrary.org/item/b30076201.

[46] Rural District Council of Sedgefield Union and Frederick Hunton, *Annual Report 1908*, 12.

> I have previously reported to you that the so-called streets are nothing better than a collection of cesspools, and that you have not a much higher death rate, or a serious outbreak of epidemic disease as a consequence, is a piece of good fortune that you have already trifled with too long.[47]

Certainly, Hunton's opinionated and straightforward criticisms of his council set him apart from other MOHs in the county. His use of eugenic language and persuasions, as highlighted in Hill's annual reports, further differentiated his approaches from those of his MOH counterparts. Yet, his focus on addressing the sanitary concerns of his district were strongly in line with the actions of the other MOHs from coal mining districts. Moreover, he was not the only MOH to link the use of abortifacients with higher IMRs. He was just the only MOH to aggressively dispute the usefulness of health visitors in addressing high IMRs.

One of the more prominent MOHs in support of health visitors being used to curb infant mortality was W. Mussellwhite from Spennymoor. He began his appointment in 1905, and immediately identified infant mortality as a primary concern for his district. Prior to Mussellwhite, the MOH in Spennymoor had a limited focus on preventing infant mortality, and like the MOHs from Lanchester, Easington, Chester-le-Street, and Sedgefield, he was more focused on improving the sanitary measures and overall death rates within the district. Yet, Mussellwhite's goal did not differ greatly from these other MOHs; he also aimed to lower the overall death rate within his district, However, rather than improving sanitation and addressing deaths among more mature members of the population, Mussellwhite sought to reduce the district death rate by addressing the IMR.

Infant deaths contributed to over half of all deaths within the district, leading Mussellwhite to state to his council: "I am persuaded in my own mind that unless some means are found of remedying this deplorable loss of life we shall never make any appreciable effect on our present high death rate."[48] By addressing the high IMR within the district, Mussellwhite also promised to reduce the overall death rates of Spennymoor. The IMR for Spennymoor in 1905 was 225; the highest recorded IMR in the county, and prior to 1905 the average IMR between 1892 and 1904 was 184 (see Figure 3.4).[49] While Mussellwhite was ultimately unsuccessful in obtaining a health

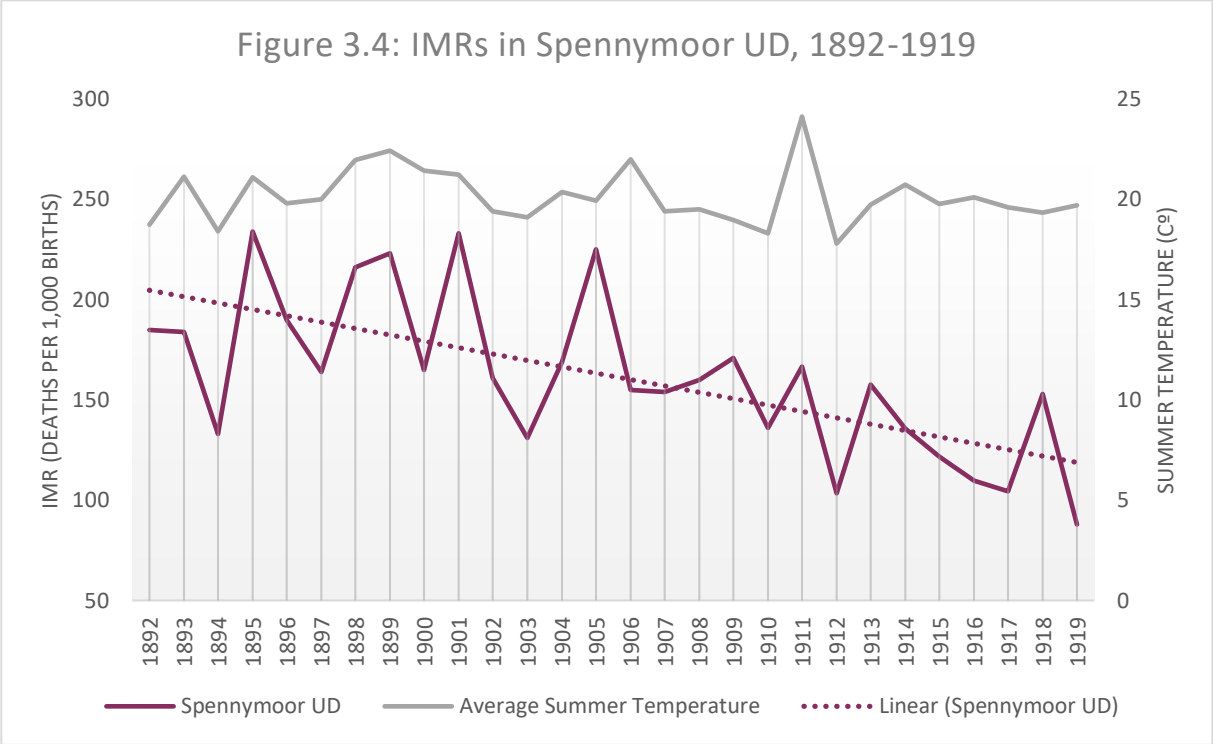
[47] Ibid.

[48] Spennymoor Urban District Council and W. Mussellwhite, *Report of the Medical Officer of Health for 3 Months Ending Dec. 31, 1905* (1906), 2-3, from the Wellcome Library. https://wellcomelibrary.org/item/b30122958.

[49] Sources for maps and graphs are available in Appendix D.

visitor for Spennymoor, the IMR declined under his appointment. Spennymoor kept the IMR for 1911 under that of the 1905-1910 average (see Sanitary Test in Appendix D).

The measures enforced and focused on by Mussellwhite to address poor infant health outcomes were directly influenced by Hill's 1905 report on infant mortality. Referring to this report, Mussellwhite indicated that the easiest and most effective route to improve infant health was to address ignorant and neglectful mothers and to ensure infants were being properly fed.[50]



Yet, Mussellwhite did not immediately request the employment of a health visitor for his district. While he was an adamant supporter for health visitors, he was initially wary of their usefulness, owing to the cost of employing one or multiple women.[51] Rather, Mussellwhite went about organising a lecture series for the mothers in his district, which was hosted out of St. Andrew's church in one of the worst performing wards. Mussellwhite was hopeful that these lectures would benefit the mothers who attended, but he did not believe that this movement alone would improve infant health, noting that while a simple lecture might not provide any immediate results, "it cannot fail to do some good, and it is better than sitting down and saying nothing can be done."[52] In his

[50] Spennymoor Urban District Council and W. Mussellwhite, *Report of the Medical Officer of Health for 3 Months Ending Dec. 31, 1905* (1906), 3, from the Wellcome Library. https://wellcomelibrary.org/item/b30122958.
[51] Ibid., 3-4.
[52] Ibid., 4-5.

first year as MOH for Spennymoor, he made it clear that he would be focusing his attentions on improving the IMR of the district, but was well aware that his council also needed to be convinced that his approaches had meaningful outcomes.

The following year, Mussellwhite was prepared to discuss more permanent measures to help reduce infant deaths within Spennymoor, including his first calls to employ female sanitary inspectors to provide guidance to new mothers. Diarrhoeal diseases were the primary and most preventable causes behind the high IMRs, with over 30 per cent of all infant deaths being attributed to this cause in 1906, and Mussellwhite attributed these deaths to the carelessness of the mothers, rather than to unsanitary surroundings.[53] In fact, he claimed that because the IMRs of the district were so high, they were overshadowing the sanitary improvements that had been executed by the council, and once mothers were properly feeding and caring for their children, the positive influence of improved sanitation within the district would become more apparent.[54] Following his 1906 report, Mussellwhite maintained that by correcting the ignorance of the mother, the IMR within Spennymoor would improve, and in turn the overall death rate would decrease. A health visitor, to Mussellwhite's mind, was the best remedy to the current plight of infant lives as they ensured mothers were following proper protocols and made any unsuitable living conditions known to medical authorities.

The insistence of MOHs like Mussellwhite who called for health visitors was influenced by national trends. In Ipswich, for example, diarrhoea related deaths were significant, but were not solely solved through improved sanitation measures. Historians Eric Hall and Michael Drake argue that improved sanitation was not the only factor that reduced IMR from diarrhoeal deaths, but rather the inclusion of other health measures that instructed mothers on how to care for their children.[55] Likewise, health visitors in Derbyshire, which included a notable mining community like those found in Spennymoor and other districts in County Durham, experienced improved IMRs due to the intervention of health visitors. In examining the routes and visits conducted by health visitors, Alice Reid has demonstrated that health visitors were able to identify high-risk homes, and

[53] Spennymoor Urban District Council and W. Mussellwhite, *Medical Officers Report, 1906* (1907), 3, from the Wellcome Library. https://wellcomelibrary.org/item/b3012296x.

[54] Ibid., 7.

[55] Eric Hall and Michael Drake, "Diarrhoea: The Central Issue?" in *Infant Mortality: A Continuing Social Problem*, eds. Eilidh Garrett, Chris Galley, Nicola Shelton, and Robert Woods, 149–68 (Aldershot, England: Ashgate Publishing, Ltd., 2006), 195.

by repeated visitations improved IMRs within the district.[56] Importantly, these targeted visits were only successful with an effective notification system. In Reid's examination of Derbyshire, it was only in combination with the adoption of the Notification Act that allowed health visitors to effectively target high-risk homes.[57]

While areas like Ipswich and Derbyshire demonstrated that health visitors improved IMRs, both studies indicated that sanitation played an important role in infant health. Sanitation was the first line of defense in infant health, and the health visitor further supplemented and supported health initiatives with her targeted visits. Reid notes that in Derbyshire, the initial success of the health visitor was not necessarily due to her work, but rather a combination of improved notification systems and household sanitation that all occurred around the same time.[58] The importance of sanitation was not ignored by MOHs like Mussellwhite, despite his claims that sanitation had little bearing over IMR and that it was the ignorant and neglectful mother alone who caused high death rates. In one of his first reports where he requested a health visitor for his district, he also urged his council not to relax their efforts in improving the overall sanitation of the district and the water supply.[59]

The approaches to infant mortality taken by each MOH in this case study demonstrates the variability of early-twentieth century public health initiatives, and how local circumstances and the personal convictions of the MOH influenced infant welfare programs. Some MOHs were more willing to engage with the mother-blaming approaches promoted by Hill and other MOHs in *Public Health*, whereas others vehemently opposed such approaches. At the same time, there were MOHs who worked to improve the general health of their districts without a direct or vocal approach to improving IMRs.

The case study provided by this chapter included a broad array of approaches and individuals representing the spectrum of infant health initiatives, and while there was some overlap in the approaches or considerations taken by MOHs, every MOH placed a high importance on ensuring that their district was meeting basic sanitary standards. This was especially true in the rural coal mining districts. Increased accommodation requirements for the coal mining and associated

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[56] Reid, "Health Visitors and 'Enlightened Motherhood'," 209.
[57] Ibid. The Notification of Births Act (1907) was a voluntary act that could be adopted by local district councils. The act required the father of a child born (or person in contact with the mother) to provide a written notification to the district Health Board within six hours of the birth. Failure to do so could result in a fine of up to £25.
[58] Ibid.
[59] Spennymoor Urban District Council and W. Mussellwhite, *Medical Officers Report, 1906*, 12.

workforces also required improved sanitary infrastructures, which were costly to implement, and at times remained unfulfilled. Nonetheless, the districts examined in this case study all demonstrated a notable decline in IMRs throughout the first decades of the twentieth century. The fact that this decline occurred despite the varied approaches to infant mortality adopted by the MOHs of each district further demonstrates the complex and dynamic factors that influenced infant health at the turn of the century.

CONCLUSION

The dynamic complexities associated with infantile mortality and its eventual decline throughout late-nineteenth and early-twentieth century England were indicative of a health crisis that spanned further than the medical sphere of influence. Social commentaries and anxieties brought about by a purported imperial decline at the turn of the century permeated maternal advice manuals, educational reforms, and medical literature alike. Infant survival provided a distinct point of convergence for these influences, and as a result, bore witness to a host of remedies and charged discussions on how to best address the abysmal IMRs across the country. Working-class mothers endured the brunt of criticism through their alleged neglect of maternal duties and ignorance of proper methods of childcare. Yet while mothers were routinely singled out by MOHs who chose to focus on addressing high IMRs, the accusations levied against them were varied and rooted in the individual biases and backgrounds of local MOHs.

The national conversations surrounding IMRs in *Public Health* reflected a broader understanding of infant health that was influenced by individual MOHs from counties and districts that were meeting or passing the sanitary test by 1911. As a result, MOHs pursued additional preventative and interventionist measures. The national conversation largely formed around educational reforms for young girls and new mothers and was in turn influenced by shifting middle-class sensibilities regarding women's education and the proper role of the mother in raising the next imperial generation. This national context surrounding infant health was echoed in local MOH reports including those of T. Eustace Hill in County Durham. These local interpretations further emphasized the significant influence of prominent MOHs like Newsholme and Newman and their influence on the infant health crisis. Within the national and regional narratives examined in this study, the mother remained central to improving infant health and providing for the next generation of imperial Britons.

While national and regional interpretations of infant health were present in some of the MOHs reports within County Durham, the predominant focus on educational reforms and employment of health visitors varied across the county. MOHs from districts in the centre of the Durham Coalfield either neglected direct approaches to infant health in favour of more holistic public health measures, or indicated that the faults of the mother lay outside her role as caregiver after the birth of her child. In other words, local MOHs seemed to recognise the limits of poverty. Nonetheless, motherhood remained medicalised whenever infant mortality was discussed, and

working-class mothers were lambasted for their suspected role in the deaths of their children. This focus on mothers coincided with a period of IMR decline in County Durham. While the IMR did not decline as quickly as the national average, the sanitary test conducted in this study indicates that over half of the districts in County Durham were improving local sanitary conditions enough to have a positive influence on infant health outcomes, despite nine of the twenty-six improved districts failing the test.

This thesis has demonstrated that infant health remained highly variable and dependent upon a multitude of interconnected social and medical practices. It shows that there was spatial variability on infant health outcomes, which complicates the growing historiography on public health and motherhood. In doing so, it has laid a foundation for future work in County Durham, and other mining communities in England and Wales seeking to examine the localised variability of infant health initiatives within a regional and national context. This thesis encourages future examinations into the individual work of local health visitors, comparing not only the results between districts where health visitors were employed, but also comparing IMRs from districts without health visitors until after the First World War. Together with other examinations into the daily lives of working-class women in County Durham, these approaches help to better understand the complex relationships among gender, class, and health.

APPENDIX A: Web-scraping with Python and Calculating IMRs 1911-1919

Introductory Python tutorials were provided through *The Programming Historian* (programminghistorian.org). Seven tutorials were used to create the web-scraping script used for this project:

1. Python Introduction and Installation
   https://programminghistorian.org/en/lessons/introduction-and-installation
   William J. Turkel and Adam Crymble, "Python Introduction and Installation," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/introduction-and-installation.

2. Downloading Web Pages with Python
   https://programminghistorian.org/en/lessons/working-with-web-pages
   William J. Turkel and Adam Crymble, "Downloading Web Pages with Python," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/working-with-web-pages.

3. Manipulating Strings in Python
   https://programminghistorian.org/en/lessons/manipulating-strings-in-python
   William J. Turkel and Adam Crymble, "Manipulating Strings in Python," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/manipulating-strings-in-python.

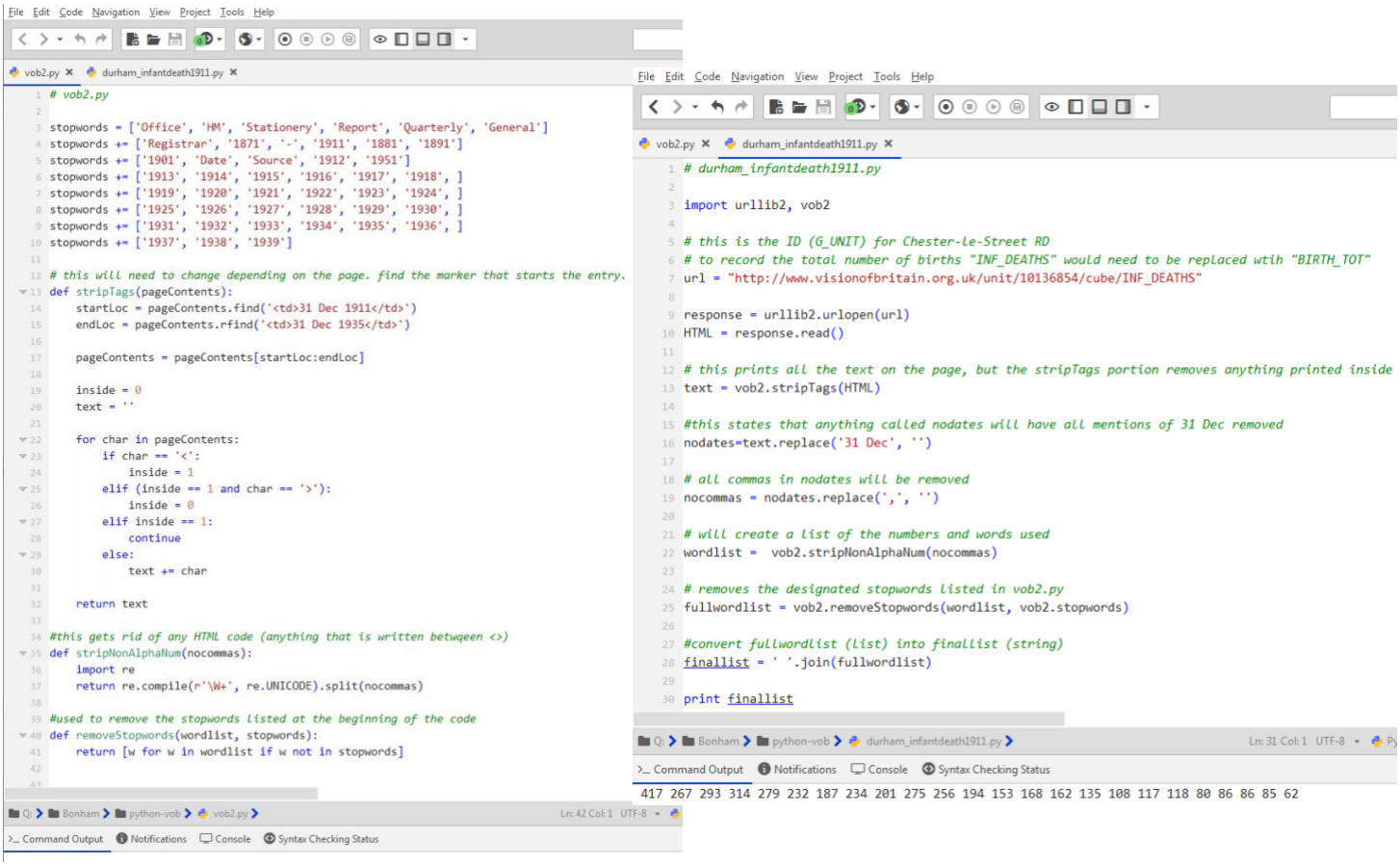
4. From HTML to Kist of Words (part 1)
   https://programminghistorian.org/en/lessons/from-html-to-list-of-words-1
   William J. Turkel and Adam Crymble, "From HTML to List of Words (part 1)," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/from-html-to-list-of-words-1.

5. From HTML to Kist of Words (part 2)
   https://programminghistorian.org/en/lessons/from-html-to-list-of-words-2
   William J. Turkel and Adam Crymble, "From HTML to List of Words (part 2)," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/from-html-to-list-of-words-2.

6. Normalizing Textual Data with Python
   https://programminghistorian.org/en/lessons/normalizing-data
   William J. Turkel and Adam Crymble, "Normalizing Textual Data with Python," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/normalizing-data.

7. Counting Word Frequencies with Python
   https://programminghistorian.org/en/lessons/counting-frequencies
   William J. Turkel and Adam Crymble, "Counting Word Frequencies with Python," *The Programming Historian* 1 (2012), https://programminghistorian.org/en/lessons/counting-frequencies.

Following the completion of these tutorials, the code used for this project was compiled with the goal of creating a script that could quickly and efficiently record infant death and birth statistics held by *Vision of Britain*.
The following images are screenshots of the code used for this project.

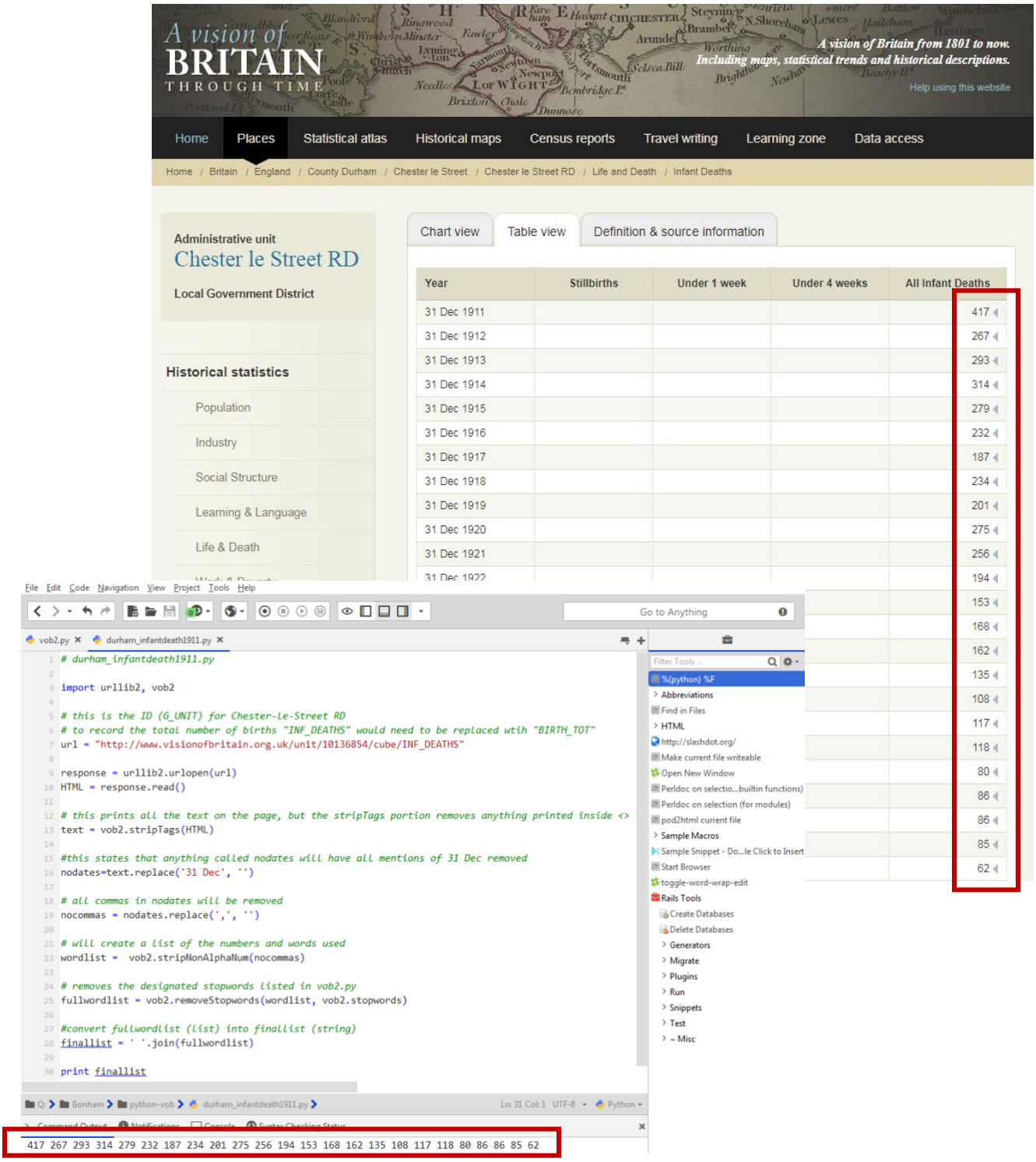


```
# vob2.py

stopwords = ['Office', 'HM', 'Stationery', 'Report', 'Quarterly', 'General']
stopwords += ['Registrar', '1871', '-', '1911', '1881', '1891']
stopwords += ['1901', 'Date', 'Source', '1912', '1951']
stopwords += ['1913', '1914', '1915', '1916', '1917', '1918', ]
stopwords += ['1919', '1920', '1921', '1922', '1923', '1924', ]
stopwords += ['1925', '1926', '1927', '1928', '1929', '1930', ]
stopwords += ['1931', '1932', '1933', '1934', '1935', '1936', ]
stopwords += ['1937', '1938', '1939']

# this will need to change depending on the page. find the marker that starts the entry.
def stripTags(pageContents):
    startLoc = pageContents.find('<td>31 Dec 1911</td>')
    endLoc = pageContents.rfind('<td>31 Dec 1935</td>')

    pageContents = pageContents[startLoc:endLoc]

    inside = 0
    text = ''

    for char in pageContents:
        if char == '<':
            inside = 1
        elif (inside == 1 and char == '>'):
            inside = 0
        elif inside == 1:
            continue
        else:
            text += char

    return text

#this gets rid of any HTML code (anything that is written betwqeen <>)
def stripNonAlphaNum(nocommas):
    import re
    return re.compile(r'\W+', re.UNICODE).split(nocommas)

#used to remove the stopwords listed at the beginning of the code
def removeStopwords(wordlist, stopwords):
    return [w for w in wordlist if w not in stopwords]
```

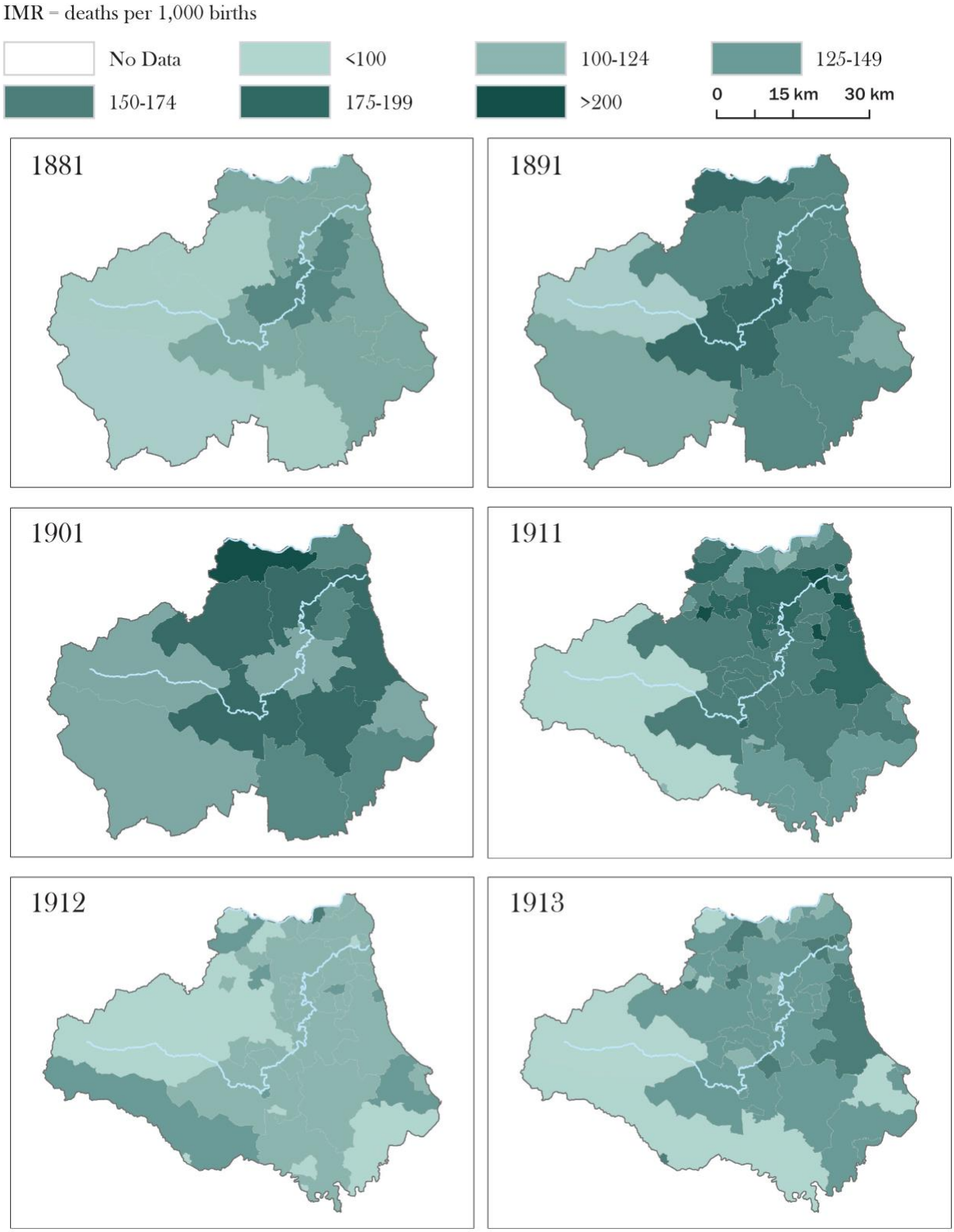
```
# durham_infantdeath1911.py

import urllib2, vob2

# this is the ID (G_UNIT) for Chester-le-Street RD
# to record the total number of births "INF_DEATHS" would need to be replaced wtih "BIRTH_TOT"
url = "http://www.visionofbritain.org.uk/unit/10136854/cube/INF_DEATHS"

response = urllib2.urlopen(url)
HTML = response.read()

# this prints all the text on the page, but the stripTags portion removes anything printed inside
text = vob2.stripTags(HTML)

#this states that anything called nodates will have all mentions of 31 Dec removed
nodates=text.replace('31 Dec', '')

# all commas in nodates will be removed
nocommas = nodates.replace(',', '')

# will create a list of the numbers and words used
wordlist =  vob2.stripNonAlphaNum(nocommas)

# removes the designated stopwords listed in vob2.py
fullwordlist = vob2.removeStopwords(wordlist, vob2.stopwords)

#convert fullwordlist (list) into finallist (string)
finallist = ' '.join(fullwordlist)

print finallist
```

```
417 267 293 314 279 232 187 234 201 275 256 194 153 168 162 135 108 117 118 80 86 86 85 62
```

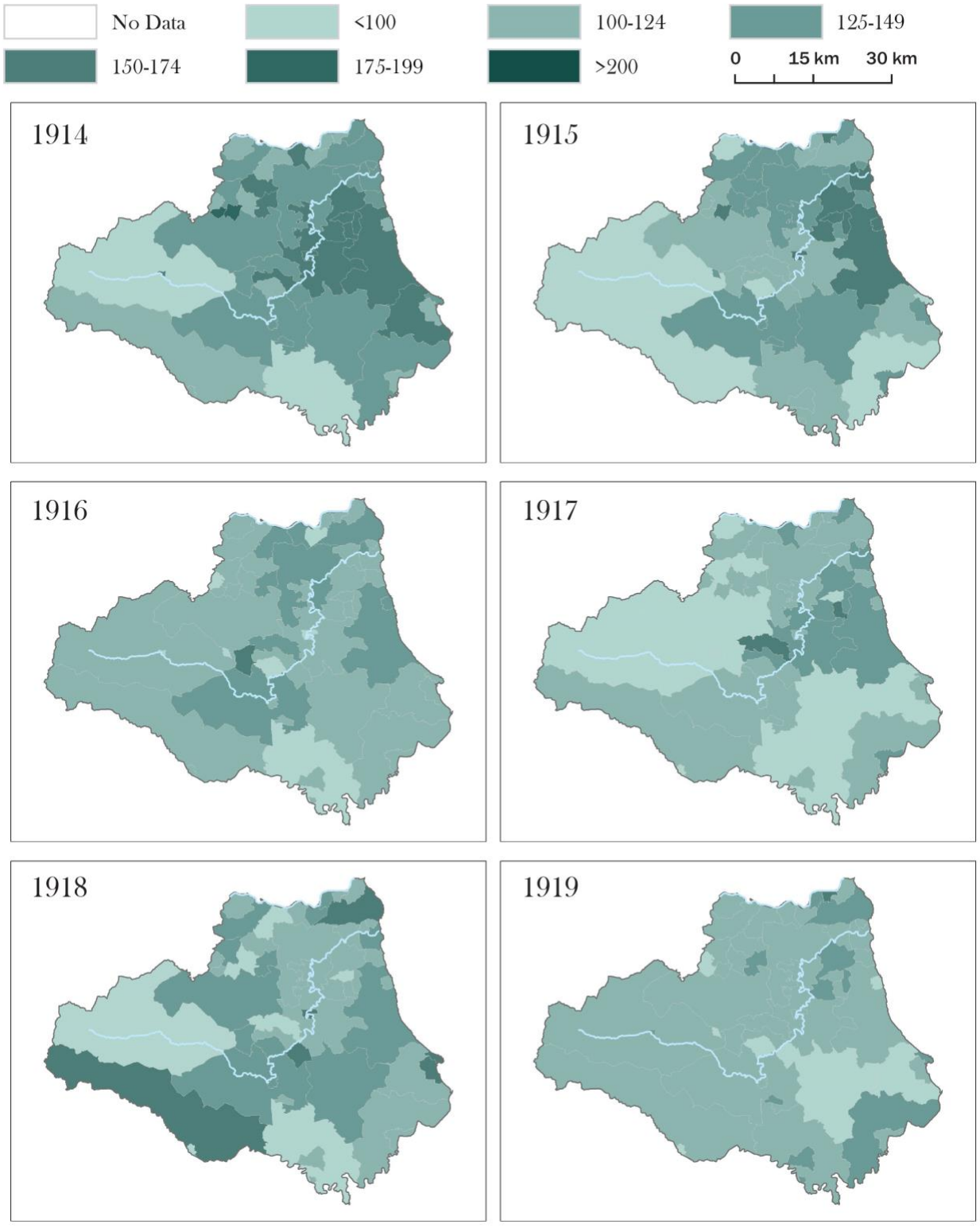
The organisation structure of *Vision of Britain* aided in the quick data acquisition. The URL for each page being scraped contained a unique ID number (or G_UNIT in the attribute data) that corresponded to all other data linked with the district and the shapefiles provided by *Vision*. The number included in the example provided (1013654) is the number linked to Chester-le-Street RD, and by changing the "INF_DEATHS" section of the URL to "BIRTH_TOT" would provide birth data for the same years within the district. A comparative between the web data and the scraped data is provided below.
Running the script provided the data in yearly progressions that could then be quickly copied in an excel document, and then linked to the map data in ArcGIS.


A vision of BRITAIN THROUGH TIME
A vision of Britain from 1801 to now.
Including maps, statistical trends and historical descriptions.
Help using this website
Home
Places
Statistical atlas
Historical maps
Census reports
Travel writing
Learning zone
Data access
Home / Britain / England / County Durham / Chester le Street / Chester le Street RD / Life and Death / Infant Deaths
Administrative unit
Chester le Street RD
Local Government District
Historical statistics
Population
Industry
Social Structure
Learning & Language
Life & Death
Chart view
Table view
Definition & source information
Year
Stillbirths
Under 1 week
Under 4 weeks
All Infant Deaths
31 Dec 1911 417
31 Dec 1912 267
31 Dec 1913 293
31 Dec 1914 314
31 Dec 1915 279
31 Dec 1916 232
31 Dec 1917 187
31 Dec 1918 234
31 Dec 1919 201
31 Dec 1920 275
31 Dec 1921 256
194
153
168
162
135
108
117
118
80
86
86
85
62
File Edit Code Navigation View Project Tools Help
Go to Anything
vob2.py
durham_infantdeath1911.py
# durham_infantdeath1911.py
import urllib2, vob2
# this is the ID (G_UNIT) for Chester-le-Street RD
# to record the total number of births "INF_DEATHS" would need to be replaced wtih "BIRTH_TOT"
url = "http://www.visionofbritain.org.uk/unit/10136854/cube/INF_DEATHS"
response = urllib2.urlopen(url)
HTML = response.read()
# this prints all the text on the page, but the stripTags portion removes anything printed inside <>
text = vob2.stripTags(HTML)
#this states that anything called nodates will have all mentions of 31 Dec removed
nodates=text.replace('31 Dec', '')
# all commas in nodates will be removed
nocommas = nodates.replace(',', '')
# will create a list of the numbers and words used
wordlist = vob2.stripNonAlphaNum(nocommas)
# removes the designated stopwords listed in vob2.py
fullwordlist = vob2.removeStopwords(wordlist, vob2.stopwords)
#convert fullwordlist (list) into finallist (string)
finallist = ' '.join(fullwordlist)
print finallist
Filter Tools ..
%(python) %F
Abbreviations
Find in Files
HTML
http://slashdot.org/
Make current file writeable
Open New Window
Perldoc on selectio...builtin functions)
Perldoc on selection (for modules)
pod2html current file
Sample Macros
Sample Snippet - Do...le Click to Insert
Start Browser
toggle-word-wrap-edit
Rails Tools
Create Databases
Delete Databases
Generators
Migrate
Plugins
Run
Snippets
Test
~ Misc
Ln: 31 Col: 1 UTF-8 Python
417 267 293 314 279 232 187 234 201 275 256 194 153 168 162 135 108 117 118 80 86 86 85 62

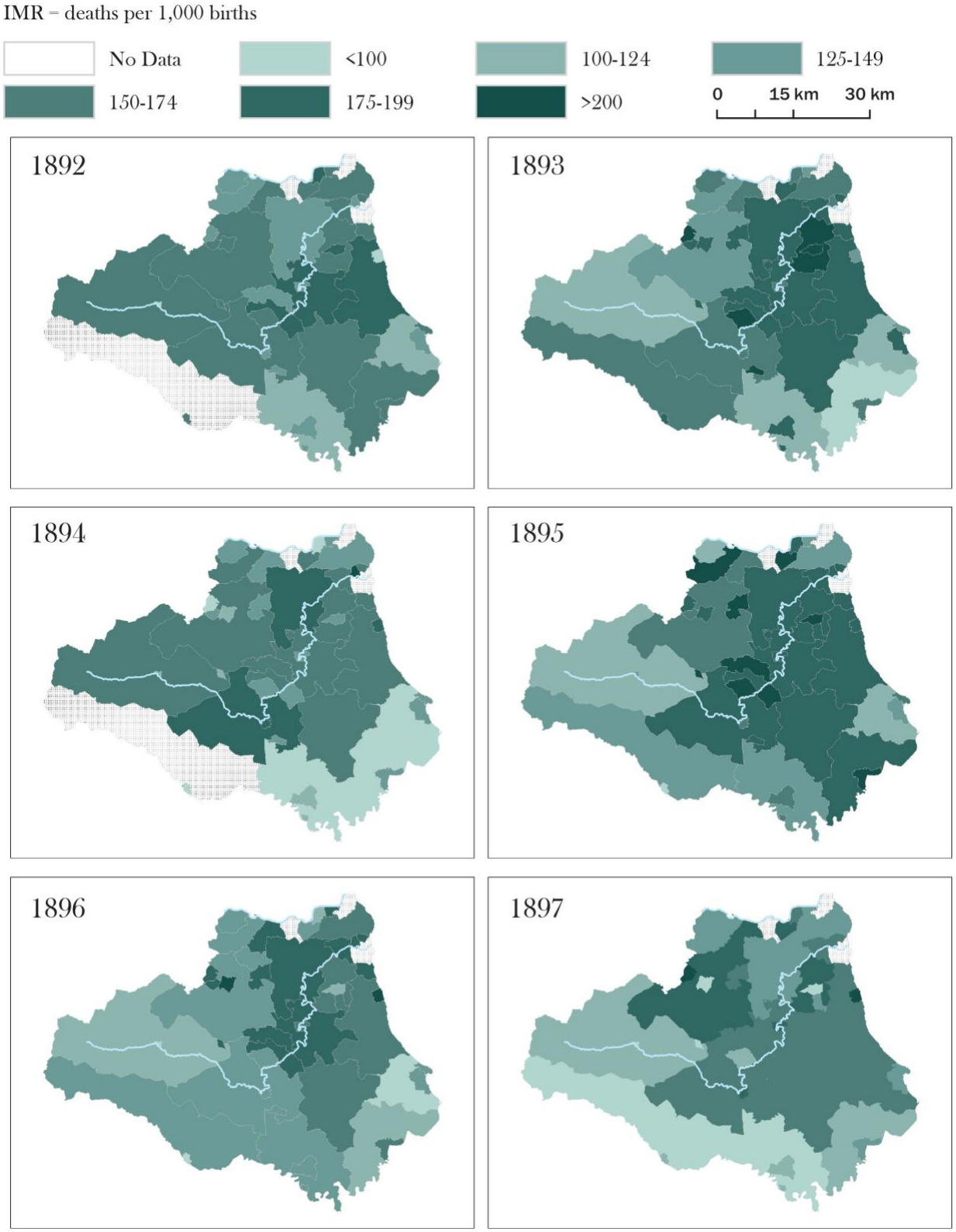
APPENDIX B1: IMRs in County Durham 1881, 1891, 1901, 1911-1919



IMR = deaths per 1,000 births

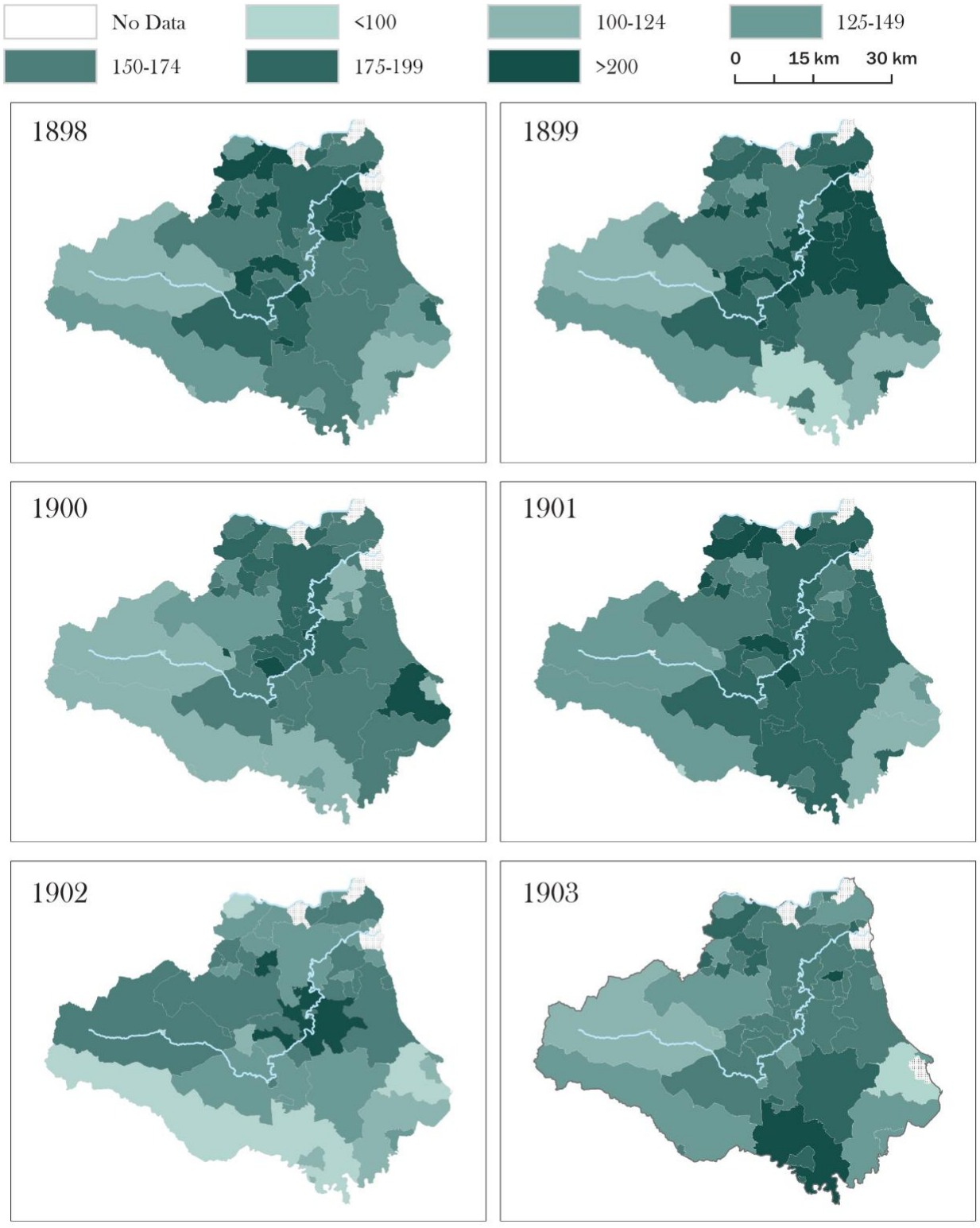


APPENDIX B2: IMRs in County Durham 1892-1919

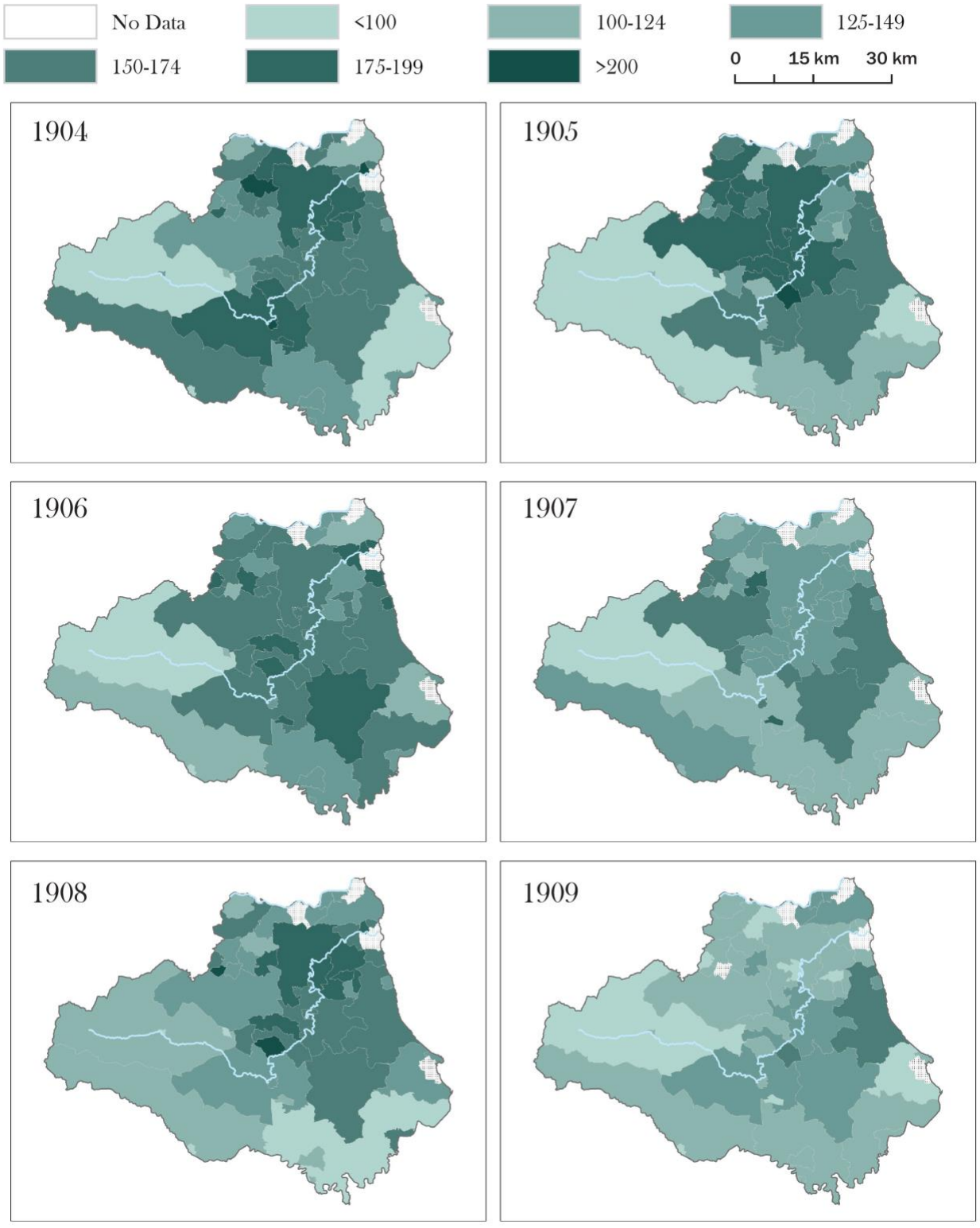


Appendix 2.2: Infant Mortality Rate (IMR) in County Durham, 1882-1919

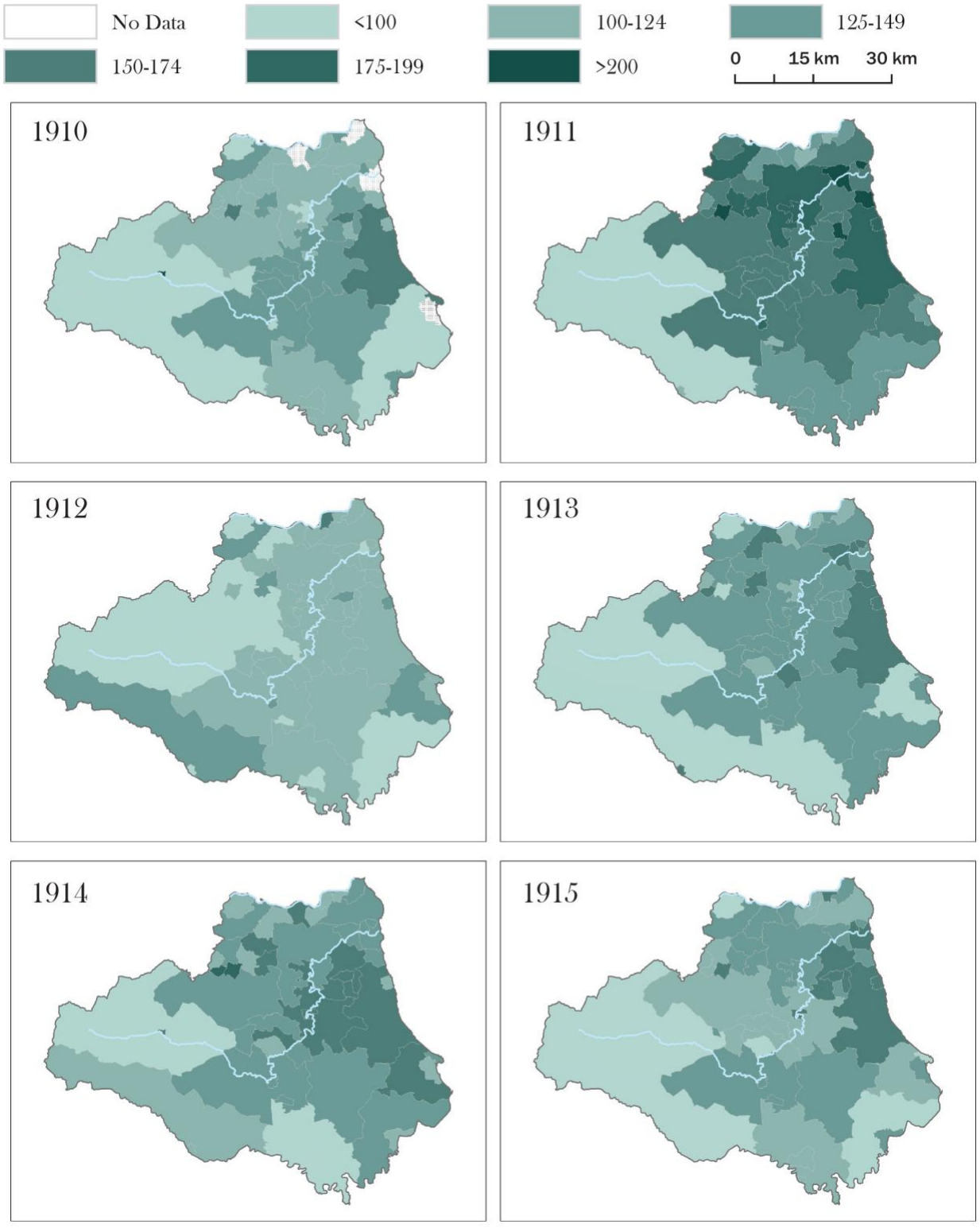
IMR = deaths per 1,000 births



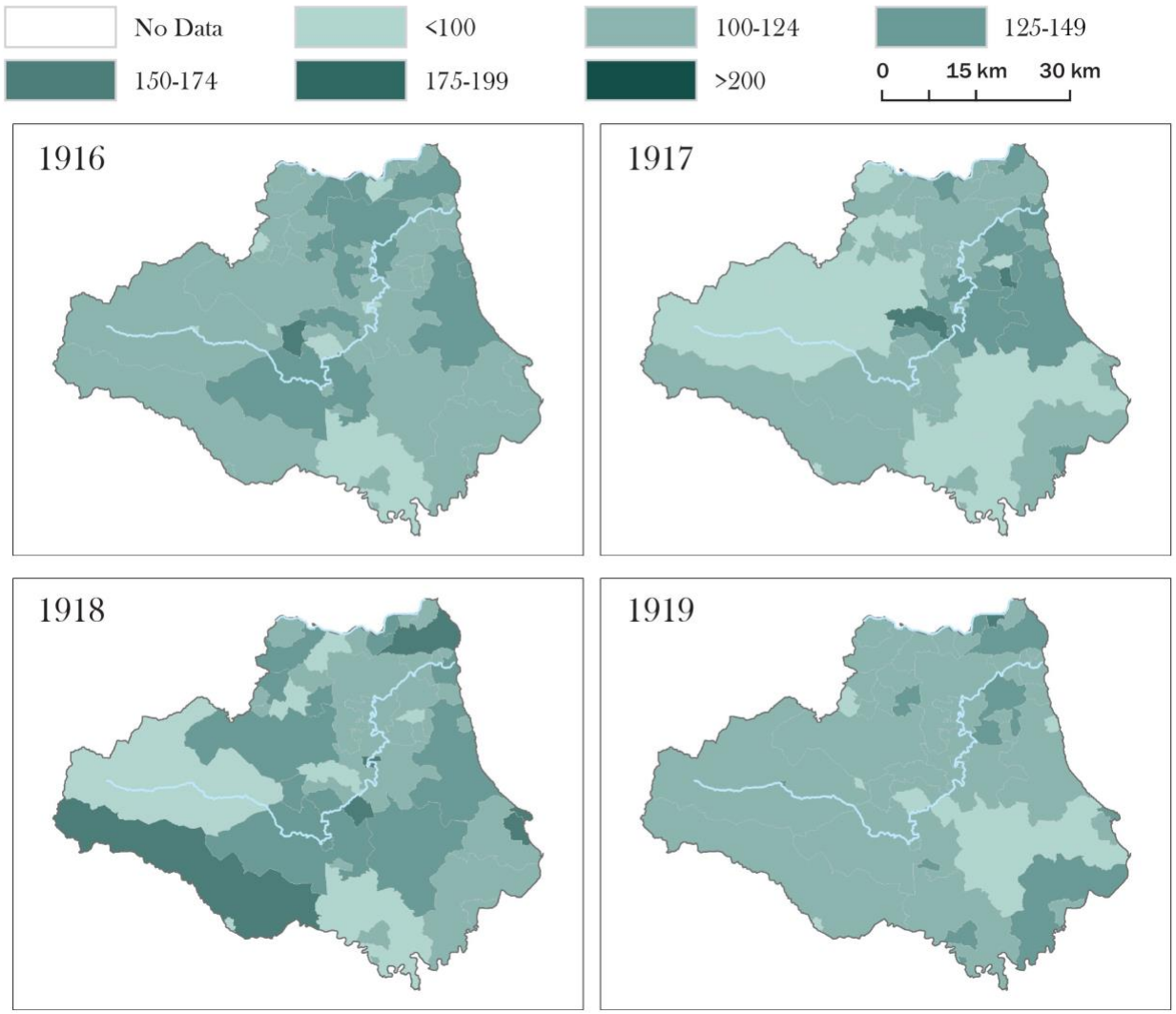
IMR = deaths per 1,000 births



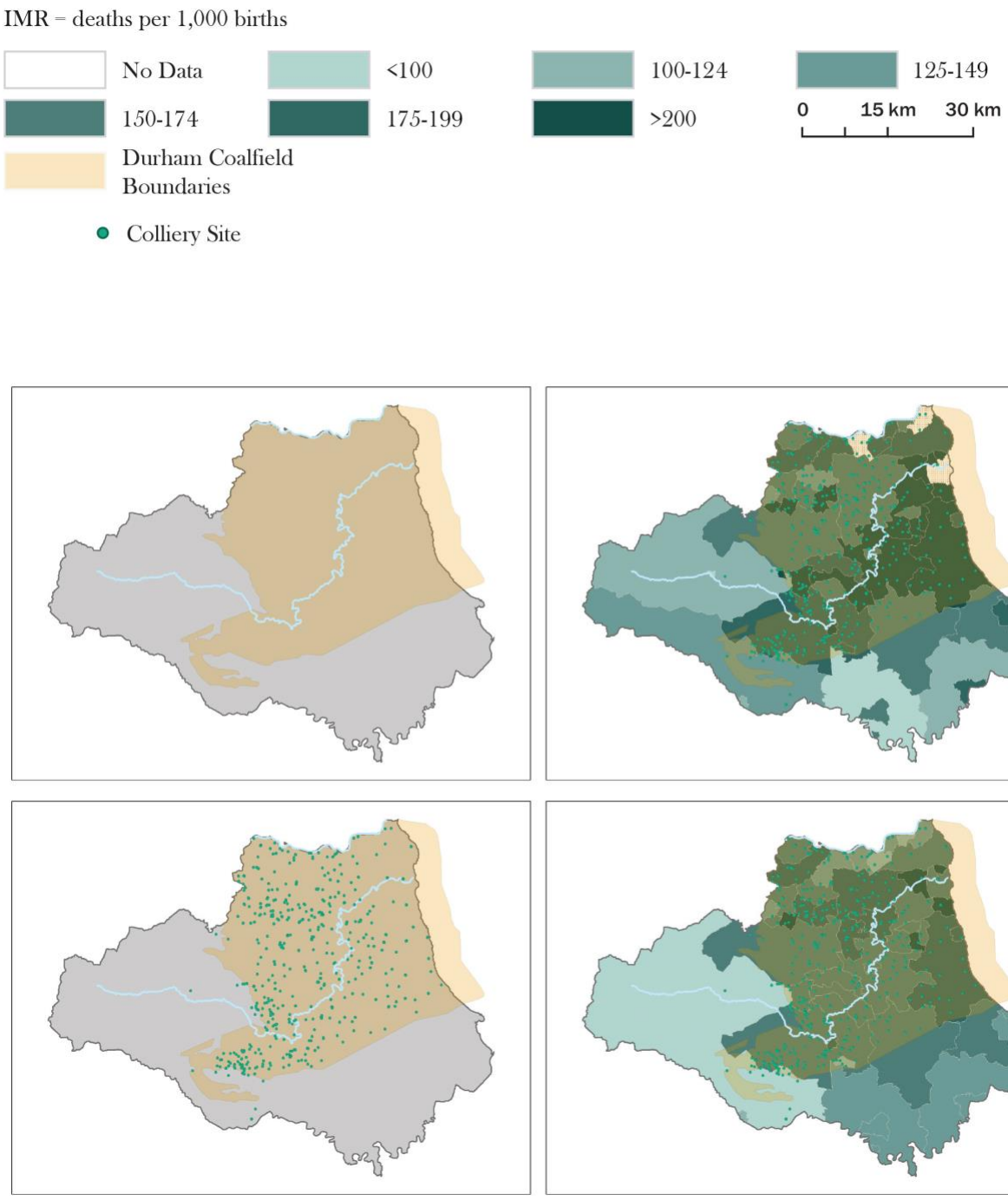
IMR = deaths per 1,000 births



IMR = deaths per 1,000 births

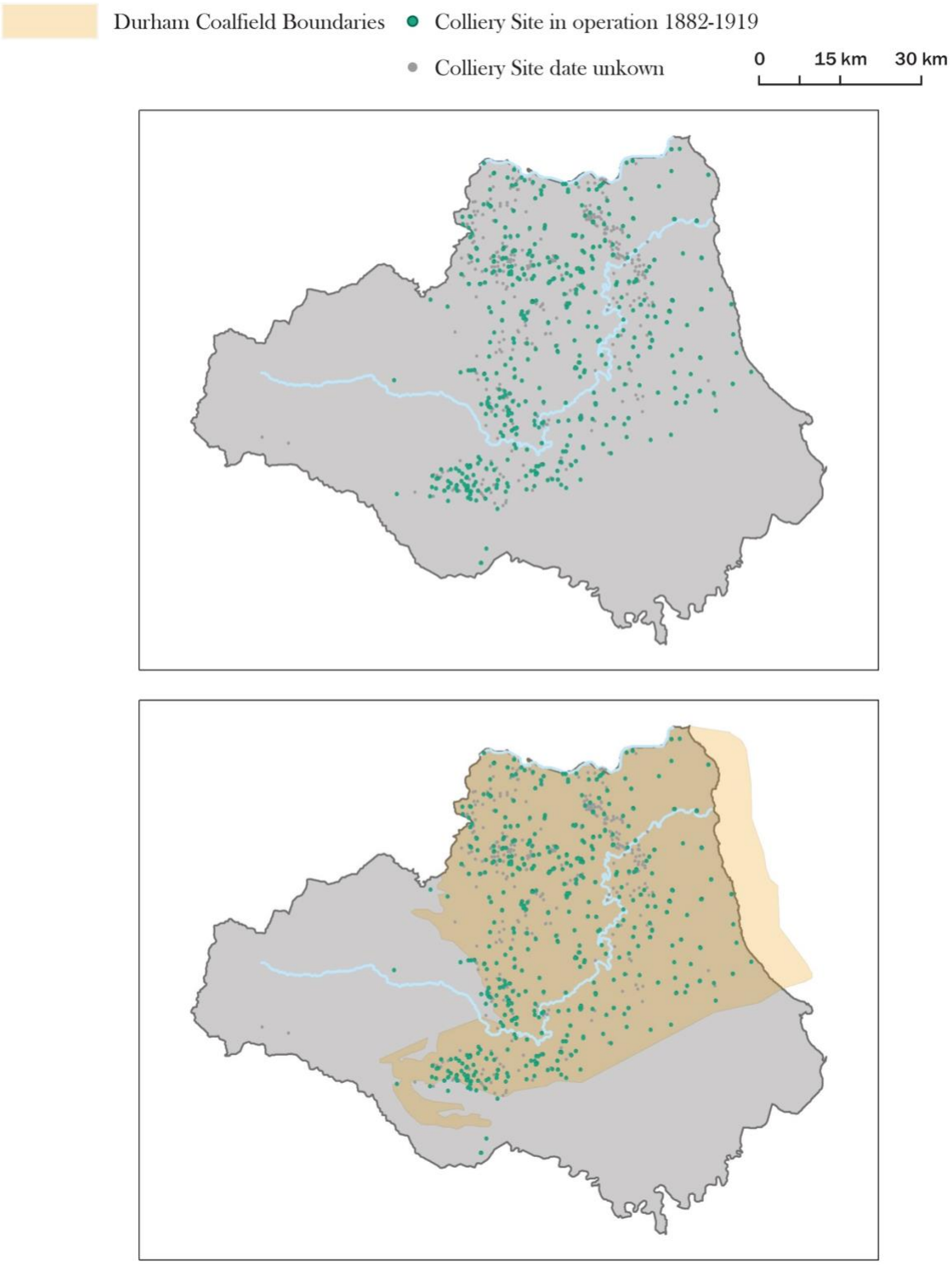


APPENDIX B3: Durham Coalfield and Colliery Sites



Coalfield and colliery sites compared to IMRs in 1911

APPENDIX B4: Colliery operations dates (known and unknown) 1892-1919



APPENDIX C: The Sanitary Test, County Durham 1911

District Name	District Type	1905-1910 Average	1911	1911 Difference	% Change	Ranking	1905	1906	1907	1908	1909	1911	Improved from 1906
SOUTH SHIELDS	CB	NA	145.41	145.41	NA	NA	NA	NA	NA	NA	NA	145.41	
SUNDERLAND	CD	NA	151.87	151.87	NA	NA	NA	NA	NA	NA	NA	151.87	
WEST HARTLEPOOL	CB	NA	129.17	129.17	NA	NA	NA	NA	NA	NA	NA	129.17	
LEADGATE	UD	111.00	223.68	112.68	101.52	1	159.00	109.00	101.00	141.00	0.00	223.68	
HARTLEPOOL	RD	89.83	166.67	76.83	85.53	2	54.00	109.00	113.00	132.00	45.00	166.67	
CHESTER LE STREET	UD	111.00	184.43	73.43	66.15	3	NA	NA	NA	NA	115.00	184.43	
HETTON	UD	129.33	208.26	78.93	61.03	4	121.00	153.00	144.00	136.00	112.00	208.26	
BISHOP AUCKLAND	UD	129.67	186.15	56.48	43.56	5	115.00	149.00	172.00	126.00	117.00	186.15	
SUNDERLAND	RD	141.83	203.17	61.34	43.25	6	162.00	177.00	128.00	152.00	117.00	203.17	
STOCKTON	RD	112.83	148.23	35.39	31.37	7	111.00	158.00	107.00	93.00	122.00	148.23	x
TANFIELD	UD	129.50	168.22	38.72	29.90	8	180.00	145.00	118.00	107.00	121.00	168.22	
SEAHAM HARBOUR	UD	149.83	193.55	43.72	29.18	9	169.00	187.00	141.00	144.00	136.00	193.55	
SOUTH SHIELDS	RD	125.33	161.38	36.04	28.76	10	129.00	101.00	116.00	140.00	148.00	161.38	
RYTON	UD	124.00	154.21	30.21	24.36	11	170.00	132.00	125.00	114.00	106.00	154.21	
BLAYDON	UD	150.00	186.15	36.15	24.10	12	180.00	158.00	139.00	159.00	117.00	186.15	
DARLINGTON	RD	107.50	132.30	24.80	23.07	13	107.00	128.00	102.00	95.00	104.00	132.30	
ANNFIELD PLAIN	UD	146.67	178.51	31.84	21.71	14	193.00	181.00	142.00	142.00	113.00	178.51	x
CHESTER LE STREET	RD	158.17	189.89	31.72	20.06	15	179.00	163.00	148.00	176.00	140.00	189.89	
DARLINGTON	MB	116.83	136.21	19.38	16.59	16	121.00	142.00	115.00	118.00	101.00	136.21	x
CROOK	UD	134.17	152.45	18.29	13.63	17	139.00	161.00	165.00	155.00	92.00	152.45	x
WHICKHAM	UD	126.67	143.88	17.22	13.59	18	123.00	162.00	138.00	127.00	95.00	143.88	x
BARNARD CASTLE	UD	95.83	108.70	12.86	13.42	19	118.00	92.00	102.00	91.00	92.00	108.70	
STANLEY	UD	161.67	180.83	19.16	11.85	20	167.00	160.00	177.00	191.00	138.00	180.83	
HARTLEPOOL	MB	133.00	148.55	15.55	11.69	21	143.00	146.00	116.00	127.00	106.00	148.55	x
DURHAM	RD	150.00	164.42	14.42	9.62	22	176.50	150.50	143.00	156.00	129.00	164.42	
HOUGHTON LE SPRING	RD	142.00	155.23	13.23	9.31	23	138.00	148.50	141.50	181.00	116.00	155.23	
EASINGTON	RD	163.00	177.97	14.97	9.18	24	174.00	174.00	162.00	162.00	153.00	177.97	x
LANCHESTER	RD	144.83	157.59	12.75	8.81	25	185.00	167.50	155.50	134.50	118.50	157.59	x
AUCKLAND	RD	146.17	157.51	11.34	7.76	26	173.00	173.00	123.00	147.00	128.00	157.51	x
WILLINGTON	UD	157.33	166.06	8.73	5.55	27	121.00	186.00	142.00	241.00	108.00	166.06	x
SEDGEFIELD	RD	161.50	168.97	7.47	4.63	28	170.00	198.00	153.00	160.00	139.00	168.97	x
CONSETT	UD	146.50	151.42	4.92	3.36	29	148.00	156.00	139.00	201.00	121.00	151.42	x
BENFIELDSIDE	UD	140.17	144.63	4.46	3.18	30	143.00	176.00	155.00	174.00	81.00	144.63	x
SOUTHWICK ON WEAR	UD	154.83	158.32	3.48	2.25	31	170.00	186.00	132.00	187.00	117.00	158.32	x
STOCKTON ON TEES	MB	133.00	133.77	0.77	0.58	32	149.00	128.00	115.00	159.00	121.00	133.77	
HOUGHTON LE SPRING	UD	152.00	152.38	0.38	0.25	33	143.00	172.00	147.00	191.00	99.00	152.38	x
SPENNYMOOR	UD	166.83	166.67	-0.17	-0.10	34	225.00	155.00	154.00	160.00	171.00	166.67	
DURHAM	MB	151.67	150.98	-0.68	-0.45	35	192.00	154.00	137.00	175.00	135.00	150.98	x
HEBBURN	UD	127.50	126.84	-0.66	-0.52	36	135.00	136.00	129.00	127.00	126.00	126.84	x
BRANDON AND BYSHOTTLES	UD	164.50	154.10	-10.40	-6.32	37	193.00	197.00	140.00	191.00	123.00	154.10	x
JARROW	MB	136.00	123.57	-12.43	-9.14	38	143.00	148.00	121.00	130.00	148.00	123.57	x
FELLING	UD	138.50	123.94	-14.56	-10.51	39	175.00	138.00	125.00	140.00	143.00	123.94	x
WEARDALE	RD	88.63	75.12	-13.51	-15.24	40	95.67	87.00	75.33	121.75	67.00	75.12	x
BARNARD CASTLE	RD	106.94	78.86	-28.08	-26.26	41	88.67	117.00	130.00	112.00	117.00	78.86	x
TOW LAW	UD	107.00	77.59	-29.41	-27.49	42	159.00	125.00	97.00	72.00	77.00	77.59	x
SHILDON	UD	140.33	100.26	-40.08	-28.56	43	167.00	190.00	182.00	101.00	96.00	100.26	x
STANHOPE	UD	100.17	52.63	-47.54	-47.46	44	122.00	46.00	68.00	44.00	116.00	52.63	

PASS

FAIL WITH IMPROVEMENTS

FAIL WITH NO IMPROVEMENTS

APPENDIX D: Maps and Graphs References

Map References

Shapefiles for County Boundaries (1911), Local Government Districts Boundaries (1911), and Registration Districts Boundaries (1881, 1891, 1901, and 1911) provided through:

GB Historical GIS / University of Portsmouth. "Data Access." *A Vision of Britain through Time*. http://www.visionofbritain.org.uk/data/.

1892 Reference Map:

Council of the County Palatine of Durham and T. Eustace Hill. *Summary of the Annual Reports of the Medical Officers of Health for the Year 1892*. 1893. From the Wellcome Library. https://wellcomelibrary.org/item/b29172858.

Graph References

Temperature Data:

Met Office. "Durham," *UK Climate – Historic data stations*. Accessed February 2017. http://www.metoffice.gov.uk/pub/data/weather/uk/climate/stationdata/durhamdata.txt.

National, County Durham, and Districts IMR Data (1892-1910):

Council of the County Palatine of Durham and T. Eustace Hill. *Summary of the Annual Reports of the Medical Officers of Health for the Year 1892*. 1893. From the Wellcome Library. https://wellcomelibrary.org/item/b29172858.

Through to,

Council of the County Palatine of Durham and T. Eustace Hill. *Annual Report of the Medical Officer of Health, T. Eustace Hill, M. B., B. Sc., F.I.C., Including a Summary of the Annual Reports of the District Medical Officers of Health, and Other Records, for the Year 1911*. 1912. CC/H10. Durham County Records Office.

National IMR Data (1911-1919):

GB Historical GIS / University of Portsmouth, "England Dep through time | Life and Death Statistics | Total Births," *A Vision of Britain through Time.* http://www.visionofbritain.org.uk/unit/10061325/cube/BIRTH_TOT.

GB Historical GIS / University of Portsmouth, "England Dep through time | Life and Death Statistics | Infant Deaths," *A Vision of Britain through Time*. http://www.visionofbritain.org.uk/unit/10061325/cube/INF_DEATHS.

County Durham IMR Data (1911-1919):

GB Historical GIS / University of Portsmouth, County Durham AdmC through time | Life and Death Statistics | Total Births, *A Vision of Britain through Time*. http://www.visionofbritain.org.uk/unit/10001171/cube/BIRTH_TOT.

GB Historical GIS / University of Portsmouth, County Durham AdmC through time | Life and Death Statistics | Infant Deaths, *A Vision of Britain through Time*. http://www.visionofbritain.org.uk/unit/10001171/cube/INF_DEATHS.

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